

5/9



22101469647



155 A



Digitized by the Internet Archive
in 2014

<https://archive.org/details/b20419090>



DISEASES
OF THE
URINARY ORGANS



BY THE SAME AUTHOR.

The Suprapubic Operation of Opening the Bladder for the Stone and for Tumours.

With 13 Engravings. 8vo. 3s. 6d.

The Diseases of the Prostate: their Pathology and Treatment:

Sixth Edition. With 39 Engravings. 8vo. 6s.

Stricture of the Urethra and Urinary Fistulæ: their Pathology and Treatment.

Fourth Edition. With 74 Engravings. 8vo. 6s.

Tumours of the Bladder: their Nature, Symptoms, and Surgical Treatment.

With numerous Illustrations. 8vo. 5s.

Practical Lithotomy and Lithotrity;

Or, an Inquiry into the best Modes of Removing Stone from the Bladder.

Third Edition. With 87 Engravings. 8vo. 10s.

The Preventive Treatment of Calculous Disease, and the Use of Solvent Remedies.

Third Edition. Crown 8vo. 2s. 6d.

Lectures before the Royal College of Surgeons on some Important Points connected with the Surgery of the Urinary Organs.

With numerous Engravings. 8vo. 2s. 6d.

Presented to the Library
by *The Author.*

CLINICAL LECTURES
ON
DISEASES
OF THE
URINARY ORGANS

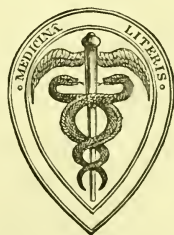
DELIVERED AT UNIVERSITY COLLEGE HOSPITAL

BY

SIR HENRY THOMPSON

SURGEON EXTRAORDINARY TO HIS MAJESTY THE KING OF THE BELGIANS
CONSULTING SURGEON AND EMERITUS PROFESSOR OF CLINICAL SURGERY TO UNIVERSITY
COLLEGE HOSPITAL: FELLOW OF UNIVERSITY COLLEGE
HONORARY MEMBER OF THE SOCIÉTÉ DE CHIRURGIE OF PARIS
ETC.

EIGHTH EDITION



LONDON
J. & A. CHURCHILL
11 NEW BURLINGTON STREET
1888

[Right of translation reserved]

M18832

WELLCOME INSTITUTE LIBRARY	
Coll.	we'MOmec
Call	
No.	WJ100
	1888
	T47c

PREFACE

TO

THE EIGHTH EDITION.

THE PRESENT EDITION contains Lectures delivered by me at the University College Hospital up to the Session of 1887-8, and comprises the whole course, making thirty-two Lectures in all, instead of twenty-six as in the last edition, and twelve in the first, which was published exactly twenty years ago.

The chief additions in the present issue relate to the suprapubic operation for stone and for tumour ; to the results of digital exploration of the bladder ; to the most recent modes of affording relief by operation in cases of advanced prostatic disease ; to the latest operative treatment for tumours of the bladder ; and embraces a *résumé* of my entire experience of operations for calculus, made up to the end of the year 1886, numbering about 900 cases.

The whole of the Lectures have been thoroughly revised ; much of the text has been rewritten, and considerable additions have been made with the object of conveying, in clear and simple language, those views which, after long enjoying an unusually wide field for practice and observation, appear to me to be the truest and the soundest respecting each topic here considered.

I may add that the general aim has been, as heretofore, to produce in the smallest compass an epitome of practical knowledge concerning the nature and treatment of the

diseases which form the subject of the work ; and I venture to believe that my intention has been more fully realised in this volume than in any of its predecessors.

It may be pardonable, perhaps, to add that I have had the gratification of finding this work employed as a Text-book in most of the medical schools of Europe, and translated for that purpose into the French, German, Italian, Spanish, and Russian languages.

35 WIMPOLE STREET, LONDON :
November 1888.



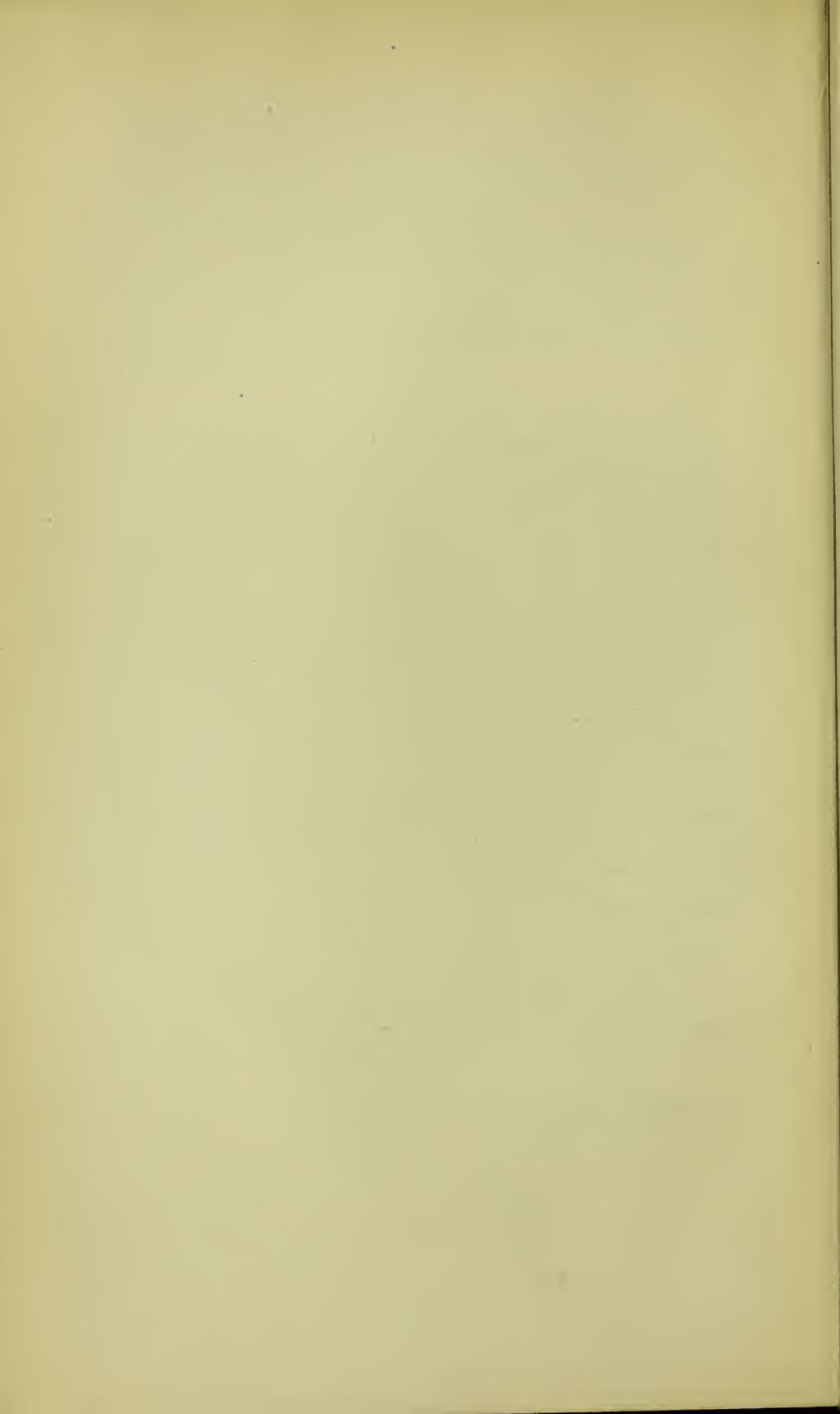
PREFACE

TO

THE FIRST EDITION.

I THINK IT RIGHT to say that these Lectures were never committed to writing by me. They were delivered in a colloquial style, after the arrangement of the subject had been well considered, and were reported verbatim by one of our best shorthand writers. The copy furnished by him was corrected, some of those tautologies which seem to be necessary in teaching removed, and then sent to the *Lancet*. But each Lecture still required more space than was available in the columns of a weekly journal, and I further reduced it, perhaps one-fourth. I now present, in one small volume, at the suggestion of, I may truly say, numerous correspondents, known and unknown to me, the corrected copy in full, unchanged in form, and therefore unshorn of the familiarities which the conversational style peculiar—and, I believe, appropriate—to the class-room demands. And I do this, also, because I prefer that these Lectures, originally short, should not suffer any abbreviation, and because I desire to offer, not merely to the members of my own clinical class, but to students at large, some of the fruit of a long and careful study in that field of practical medicine, in its widest sense, to which they relate.

35 WIMPOLE STREET, LONDON :
November 1868.



CONTENTS.

LECTURE	PAGE
I. INTRODUCTORY: DIAGNOSIS OF URINARY DISEASES. EXAMINATION OF THE PATIENT BY SIMPLE OBSERVATION . . .	1
II. DIAGNOSIS (CONTINUED). PHYSICAL EXAMINATION OF THE PATIENT	16
III. ON SOME POINTS RELATING TO THE STRUCTURE AND FUNCTIONS OF THE MALE URETHRA.	29
IV. ON STRICTURE OF THE URETHRA, ITS NATURE: AND ON THE DIAGNOSIS OF URETHRAL CONTRACTIONS	35
V. THE TREATMENT OF STRICTURE OF THE URETHRA BY DILATATION, SIMPLE AND CONTINUOUS	52
VI. ON THE TREATMENT OF CASES OF STRICTURE IN WHICH CONSIDERABLE DIFFICULTIES EXIST	67
VII. EXTERNAL URETHROTOMY.—DISTENSION GRADUAL AND FORCIBLE. RUPTURE OF THE URETHRA AS AN OPERATION . .	85
VIII. INTERNAL URETHROTOMY	92
IX. THE ENLARGED PROSTATE OF ELDERLY MEN, COMMONLY CALLED HYPERTROPHY, AND ITS CONSEQUENCES . . .	107
X. TREATMENT OF SENILE ENLARGEMENT OF THE PROSTATE. .	120
XI. THE EMPLOYMENT OF CATHETERISM FOR HABITUAL RETENTION FROM ENLARGED PROSTATE	136
XII. ON OPERATIVE MEANS FOR THE RELIEF OF PATIENTS WHO HAVE LONG REQUIRED HABITUAL CATHETERISM FOR PROSTATIC OBSTRUCTION	145
XIII. RETENTION OF URINE FROM VARIOUS CAUSES	155
XIV. EXTRAVASATION OF URINE AND URINARY FISTULÆ . .	166
XV. ON CERTAIN NERVOUS AND FEBRILE PHENOMENA ASSOCIATED WITH THE EMPLOYMENT OF INSTRUMENTS IN THE URETHRA AND BLADDER. SHOCK. URINARY FEVER .	178

LECTURE	PAGE
XVI. GENERAL OBSERVATIONS ON THE NATURE OF STONE IN THE BLADDER: OF ITS SYMPTOMS AND DIAGNOSIS . . .	189
XVII. THE TREATMENT OF STONE BY OPERATION FOR ITS RE- MOVAL	211
XVIII. PRACTICAL DIRECTIONS FOR PERFORMING THE OPERATION OF LITHOTRITY	227
XIX. THE AFTER-TROUBLES OF LITHOTRITY	241
XX. LITHOTOMY IN THE MALE SUBJECT BY OPERATIONS IN THE PERINEUM	255
XXI. ON THE SELECTION OF CASES FOR LITHOTRITY AND LITHO- TOMY—THE MORTALITY FOLLOWING THESE OPERATIONS. CALCULUS IN WOMEN	278
XXII. THE HIGH OR SUPRAPUBIC OPERATION	289
XXIII. ON THE INFLUENCE OF RENAL DISEASE ON THE CHOICE OF OPERATION FOR STONE IN THE BLADDER	305
XXIV. THE EARLY HISTORY OF CALCULOUS DISEASE, AND THE TREATMENT BEST ADAPTED FOR ITS PREVENTION	320
XXV. THE DIETETIC TREATMENT OF PATIENTS EXCRETING URIC ACID IN EXCESS	340
XXVI. THE TREATMENT OF STONE IN THE BLADDER BY SOLVENTS: ITS HISTORY AND PRACTICE	350
XXVII. ON CYSTITIS AND PROSTATITIS, ACUTE AND CHRONIC	365
XXVIII. DISEASES OF THE BLADDER: PARALYSIS; ATONY; JUVENILE INCONTINENCE	384
XXIX. THE OPERATION OF EXPLORING THE BLADDER BY PERINEAL SECTION OF THE URETHRA (DIGITAL EXAMINATION) AS A MEANS OF DIAGNOSIS, ETC.	393
XXX. TUMOURS OF THE BLADDER	409
XXXI. HÆMATURIA; RENAL CALCULUS	434
XXXII. THE EXAMINATION OF THE URINE FOR CLINICAL PURPOSES	447
INDEX	461

LIST OF ENGRAVINGS.

FIG.	PAGE
1. BATTERY FOR THE NITZE-LEITER ENDOSCOPE	21
2. ENDOSCOPIC SOUND FOR EXAMINING ANTERIOR PART OF VESICAL CAVITY	22
3. DITTO, FOR POSTERIOR PART OF DITTO	22
4. APPARATUS FOR EXAMINING INTERIOR OF URETHRA	26
5. DIAGRAM OF BLADDER AND URETHRA	30
6. DIAGRAM OF URETHRA TO SHOW ITS EXTENSIBILITY	32
7. DITTO, SHOWING ITS DIVISIONS	42
8. BOUGIE WITH POINT TURNED UP	42
9. BLUNT-ENDED BOUGIE	47
10. METAL BULBOUS EXPLORING INSTRUMENTS	50
11. ANOTHER FORM	50
12. OLIVARY BOUGIE AND CATHETER	56
13. THE FRENCH GAUGE	59
14. METALLIC DILATORS	60
15. BOUGIE WITH LEAD STYLET	61
16. MODE OF TYING IN THE CATHETER	63
17. VERY SMALL GUM-CATHETER	72
18. VERY FINE SILVER DITTO	72
19. SMALL TWISTED BOUGIES	75
20. DIAGRAMS OF STRICTURE	76
21. URETHRA LAID OPEN, SHOWING STRICTURE	80
22. DITTO DITTO	80
23. OVERSLIDING CATHETERS	81
24. SYME'S STAFF FOR EXTERNAL DIVISION	87
25. PERRÈVE'S DILATOR	88
26. AUTHOR'S DISTENDING INSTRUMENT FOR STRICTURE	89
27. SMALL BISTOURI CACHÉ	93
28. STRICTURES NEAR ORIFICE	94
29. MAISONNEUVE URETHROTOME	95
30. AUTHOR'S FIRST URETHROTOME	99

FIG.	PAGE
31. AUTHOR'S SECOND URETHROTOME	99
32. BULBOUS SOUNDS CORRESPONDING THERETO	100
33. DIAGRAM OF HEALTHY PROSTATE	110
34. DIAGRAM OF PROSTATIC TUMOUR	110
35. PROSTATE ENLARGED BY TUMOURS	111
36. GENERAL ENLARGEMENT OF PROSTATE	111
37. THE COUDÉE CATHETER	118
38. BADLY CURVED CATHETER	123
39. CATHETER MOUNTED ON OVERCURVED STYLET	124
40. BICOUDÉE CATHETER	125
41. PROSTATIC CATHETERS	126
42. HOLLOW SOUND FOR SUPRAPUBIC PUNCTURE	151
43. SUPRAPUBIC TUBE, SIDE VIEW	153
44. DITTO, BACK VIEW	153
45. MODIFIED FORM OF DITTO	153
46. SECTION OF PELVIS	164
47. SMALL URIC ACID CONCRETIONS	191
48. SOUND FOR EXAMINING THE BLADDER	202
49. DITTO, ANOTHER CURVE	202
50. DITTO, ANOTHER CURVE	202
51. SOUND WITH CYLINDRICAL HANDLE	206
52. LITHOTRITE OF CIVIALE	216
53. AUTHOR'S LITHOTRITE	216
54. FENESTRATED LITHOTRITE	218
55. ANOTHER FORM	218
56. PARTIALLY FENESTRATED LITHOTRITE	219
57. LITHOTRITE WITH FLAT BLADES	220
58. DITTO DITTO	220
59. BROAD HANDLE FOR LITHOTRITE	221
60. SIR PHILIP CRAMPTON'S ASPIRATOR	222
61. CLOVER'S ASPIRATOR	222
62. DITTO, MODIFIED BY AUTHOR	223
63. GLASS TRAP FOR DITTO	223
64. AUTHOR'S ORIGINAL ASPIRATOR	224
65. LATEST FORM OF AUTHOR'S ASPIRATOR	225
66. EVACUATING CATHETERS	226
67. MANNER OF HANDLING THE LITHOTRITE	232
68. ORDINARY POSITION FOR LITHOTRITY	233
69. HOLDING THE LITHOTRITE FIRMLY	234
70. LITHOTRITE WITH REVERSED BLADES	235
71. LONG URETHRAL FORCEPS	243

FIG.	PAGE
72. CURETTE	243
73. SHORT-BLADED LITHOTRITE	243
74. MODE OF SEARCHING FOR LAST FRAGMENT	243
75. INDIARUBBER INJECTING-BOTTLE WITH OVERLAPPING NOZZLE	249
76. BONES AND LIGAMENTS OF PELVIS	263
77. DISSECTION OF PERINEUM	264
78. LITHOTOMY STAFF	265
79. LITHOTOMY ANKLETS	266
80. LITHOTOMY YOKE	267
81. INCISION THROUGH THE PROSTATE	269
82. LITHOTOMY KNIFE	270
83. LITHOTOMY FORCEPS	270
84. BLUNTED GORGET	271
85. TENACULUM	272
86. THE TUBE WITH 'PETTICOAT'	273
87. THE AIR TAMPON	273
88. SECTION OF PELVIS, BLADDER, AND RECTUM—NATURAL	296
89. DITTO; RECTUM DISTENDED AND BLADDER INJECTED	297
90. BAG FOR INJECTING THE RECTUM	298
91. DITTO; OVAL IN FORM	300
92. IVORY SEPARATOR	301
93. FLAT DIRECTOR	301
94. END OF SOUND FILLED BY BULB	304
95. DITTO, BULB WITHDRAWN	304
96. SACCULATED BLADDER AND PROSTATE	374
97. INSTILLATION SYRINGE	375
98. INSTRUMENT FOR INJECTING THE PROSTATIC URETHRA	383
99. TAPERING DIRECTOR	400
100. FORCEPS FOR TUMOURS	403
101. DITTO	403
102. CURVED FORCEPS	403
103. DITTO	403
104. POLYPOID TUMOUR OF THE BLADDER	411
105. PAPILLOMA, MICROSCOPIC; GENERAL VIEW	412
106. DITTO; HIGHER POWER	413
107. FIMBRIATED PAPILLOMA	413
108. DITTO	414
109. LARGE FIBRO-PAPILLOMA	414
110. DIAGRAM OF TUMOUR	428
111. DITTO	428
112. DITTO	429

FIG.	PAGE
113. DIAGRAM OF TUMOUR	430
114. DITTO	431
115. DITTO	432
116. MICROSCOPIC URIC ACID	454
117. URATES AND OXALATES	455
118. PHOSPHATES	456
119. BLOOD CORPUSCLES AND PUS	457
120. EPITHELIUM	458
121. URINARY CASTS	459

DISEASES OF THE URINARY ORGANS.

LECTURE I.

INTRODUCTORY : THE DIAGNOSIS OF URINARY DISEASES. EXAMINATION OF THE PATIENT BY QUESTIONS AND SIMPLE OBSERVATION.

GENTLEMEN,—I propose to give a course of lectures on the Surgical Diseases of the Urinary Organs, and my object will be to afford you that information which will be most useful at the bedside. I shall not have much to say about anatomy or physiology, since to teach these would make the course far too long. In the systematic course of surgical lectures at the College it is impossible to communicate a knowledge of all those practical manœuvres, those little attainments and resources, in aid either of diagnosis or of treatment, which one arrives at by experience, and which are so valuable in practice hereafter. Nor is it possible that you should acquire all this at the bedside, since no hospital can furnish patients sufficient for the purpose; but you can learn a great deal by the conversational communications which are made here. It will be my aim to render available the result of experience which it has cost me years to acquire, and I shall do my best to furnish to you what of it is thus communicable in the few hours we may devote to the purpose during the session.

I have selected this course of clinical lectures on the urinary organs for two reasons.

First, because my wards always afford *groups* of these

cases: we can always find there abundant material for consideration at the weekly clinical lecture.

Secondly, because I do not know any class of diseases that are so successfully dealt with if you understand what you are about, or any in which you may make such dangerous mistakes if you are not well acquainted with them. Neither do I know any diseases in which you can afford so much relief to suffering; there are none in which a skilled hand can do so much for the patient, or by which you can gain more credit for yourselves. It is therefore exceedingly important that you should be thoroughly acquainted with them.

I hope, in this course of lectures, to carry you through the greater portion of the list of subjects named below.

I. DISEASES OF THE URINARY PASSAGES.

a. Diseases essentially inflammatory.

Urethritis,	} acute and chronic.
Prostatitis,	
Cystitis,	

b. Diseases essentially obstructive.

Stricture of the urethra.
Hypertrophy of the prostate.

c. Calculous Diseases.

Of the urethra.
Of the prostate.
Of the bladder.
Of the pelvis of the kidney.

d. Tumours—malignant and non-malignant.

Of the prostate.
Of the bladder.

II. DISEASES CONNECTED WITH THE SECRETING ORGANS.

Conditions in which uric acid and oxalic acid, chiefly the former, are excreted in quantity too large to admit of their transit in a soluble state, and the consequent persistence of sabulous deposits.

All organic changes in the kidney ; also those altered conditions of the urine which depend on constitutional disease, such as Bright's disease and saccharine diabetes.

These latter will be incidentally alluded to, but not studied here—they are therefore only named. You are supplied in another course with information relating to them, with which I assume you to be acquainted.

But before commencing, I shall ask you to consider for a moment the title I have affixed to this course—viz. 'The Surgical Diseases of the Urinary Organs.'

Now, you may inquire, 'What are the Surgical diseases of the urinary organs, and what are not?' To my mind it is very easy to tell you what are surgical diseases of those organs, but less easy to decide what are not so. Look at the list before you, and see where the line should be drawn. Certainly the first division belongs entirely to that class, embracing, as it does, all diseases of the urinary passages, but excluding most affections of the kidneys—calculus of which, however, as well as tumour, are now notably assigned to the province of the surgeon. By far the greater portion of this important class of diseases necessarily falls to his care. The physician conventionally claims the care of renal disorders not requiring mechanical treatment, and he brings to the task a profound knowledge of vital chemistry, of physiology, normal and morbid, without which neither surgical nor medical treatment can be rational or scientific. But since it is impossible to make a diagnosis of any of those diseases without well understanding the whole, and as the physician does not make a physical examination by means of an instrument, I am compelled to regard all affections of the urinary organs as chiefly falling within the province of Surgery. For it is absolutely impossible to make a trustworthy diagnosis of urinary diseases without a practical familiarity with the use of the sound or catheter ; and the physician, as a matter of convention, does not employ them. But you may as well attempt to treat diseases of the urinary organs without ability to use these instruments, as to treat diseases of the chest without understanding the use of the stethoscope, and the indications which it affords.

The first step in our course is naturally that relating to

Diagnosis. I say almost nothing about the pathology and treatment of any one of these diseases to-day. The question before us now is diagnosis; and I need scarcely remind you that this is the most important thing in all diseases—to know accurately what you are about to treat: there is then very little difficulty as to the management. Many books can teach all that is known of one; no book can teach what you must know of the other. The art of diagnosis can only be attained by the application of rules or principles, with an adequate amount of practice. It is the first thing to learn, and the last thing to be perfectly acquired. Indeed, no man, let him live as long as he may, will ever be a perfect diagnostician. He may approach perfection; but if he is a diligent student, as he ought always to be, he will improve his powers of diagnosis as long as he lives. If he does so, not otherwise, he exemplifies the process by which age or experience gives value to an opinion. Long and intelligent observation and extensive experience enable a man to arrive at a diagnosis with a greater certainty than the younger practitioner can possibly attain.

What is Diagnosis? It consists, first of all, in the acquisition of facts; and, secondly, in obtaining legitimate inferences from those facts.

Now, the acquisition of facts is one of the most difficult things in the world. No two persons ever agree in their statements descriptive of an occurrence to which they both have been witnesses. If I bring a case of disease before you here, and ask ten of you to take as many histories of it, I will undertake to say that each one will materially differ, and that I shall get ten histories varying from each other in some important particulars. Each will be approximately true; none will be absolutely correct. You must then diligently learn to observe, and to do so well requires special qualities and much practice. Is it not a very striking illustration of what I have said, that if two witnesses relate precisely similar stories of any given event, the suspicion of collusion is always instantly suggested, and is, indeed, very naturally aroused? It is worth observing, that the qualities which men of our profession require, and which we should endeavour to cultivate, are precisely such as are necessary to those who

are engaged in the exercise of the legal profession ; and the men who are really successful in either profession are very much alike in intellectual character and attainments. In our profession, equally with that of the law, the ability to make a keen examination of the statement, and an acute and subtle cross-examination of the witness, to separate depositions as to fact, from hearsays, fancies and opinions, is essential ; and, finally, the inquirer must possess a calm judicial habit of weighing the facts when obtained. And in both professions the issues raised are equally weighty, and demand in either case the highest qualifications in the individual.

But next, I have not only to call your attention to the necessity for making a careful and accurate diagnosis, it is equally important that you should learn to make it rapidly. For it must be admitted that our proceedings differ from those of the law in this respect ; for while—as we have seen not so long ago—several months may be devoted to the critical investigation of a legal claim, and a considerable period of time must mostly be expended on the proof or disproof of any allegation, our decisions are required without delay. While the doctors are deliberating the patient is dying.

Hence the ability to make a diagnosis is not sufficient ; the *Art of making a rapid diagnosis* must also be attained. Thus, when called to the bedside, your action must often depend on the first three or four minutes of your interview. It may be easy to go home, quietly think over the case, pull down the authorities, and say, ‘I think the patient has so-and-so.’ That will not always do ; it may do in some cases, and it had better do than that you should attempt to treat the case without having made up your mind as to the diagnosis. But that which will make you successful, that which distinguishes between the intelligent practitioner and him who is not so, is the ability to make a rapid as well as an accurate diagnosis of the case before him.

To this end—and what I have to say applies to all departments of our art—I advise you always to pursue a uniform method. Order and uniformity are essential elements in directing the necessary investigation ; and after much thought and experiment, for my own private guidance as well as for yours, I have adopted the following system.

Relative to the class of diseases we are studying, there are three methods of obtaining the facts required :—

Firstly, by questions of the patient ;

Secondly, by physical examination of the body ;

Thirdly, by examination, chemical and otherwise, of the secretions.

Let me premise, in pursuance of our plan, that the male sex of the patient is always to be understood ; modifications which are obvious and therefore not specified being requisite in cases of the other sex.

First, by questions. There are at least four, but in order to be very careful let us say six, chief questions to be employed : following always the same order. They ought, with the minor inquiries which branch out of them, to determine nine out of ten cases which come before you. They relate to six signs and symptoms more or less met with in patients affected with complaint in any part of the urinary organs. Frequent micturition ; painful micturition ; obstructed micturition ; deviation in the character of the urine itself from the healthy standard ; the addition of blood to the urine ; and local signs of renal disease.

The first question, then, which I invariably ask of any patient so affected, is, ‘ Have you any, and, if any, what frequency in passing water ? ’ Then, as a branch of that question, and arising out of it, I ask whether frequency is manifested more by night or by day, during rest of the body, or during movement ; or if there is any other circumstance which may thus affect the function. How the question applies we shall see hereafter.

Then, secondly, I ask whether there is pain in passing urine ; and, if so, whether before, during, or after the act ; what is its character—acutely smarting, dull, evanescent, or continuous ; also, what is the precise seat of the pain—in the penis, above the pubes, or elsewhere. Inquire also if pain is felt at other times, and if it is produced or aggravated by quick movements of the body.

Thirdly : the character of the stream is to be observed, whether it is small or full, twisted or irregular in form, feeble or forcible, continuous or the reverse, issuing in part or wholly by fistulous channels.

Then I ask, as a fourth question, 'Is the character of the urine altered in appearance, in odour, or otherwise? Is it turbid or clear?' Possibly the patient will tell you that it is turbid, but you find, on questioning further, that it was passed perfectly clear, and only became thick after cooling or standing. Also, as arising out of this, you may often ask, 'Does it vary much in quantity?' noting of course the specific gravity. The healthy standard, both as regards quantity and density, however, must be allowed very extensible limits, and both, I need not tell you, are very important elements in regard of renal disease. Are the normal constituents large or the reverse? or are any unnatural elements present, as albumen, sugar, &c.? What inorganic deposits, crystalline or other, are met with, and what organic materials are found as regular or occasional deposits in the urine?—leading to the whole subject of urine analysis, merely to be named here to-day.

The fifth inquiry is to determine whether blood has been passed in any way with the urine; and, if so, whether it appeared of a bright red tint, or of a brownish hue; whether the blood and urine are intimately mixed, or whether the blood is chiefly passed at the end or at the beginning of making water, or only appears with the last effort to empty the bladder; or, lastly, whether it issues independently of micturition altogether.

Sixthly: it may be necessary also to inquire for the presence of pain in the back, loins, and hips, permanent or transitory, and for the occurrence of periodical attacks of severe pain there, obviously renal.

These are the six questions; and let me remark, that the value of the answers you get will depend very much upon the way in which you put the questions. The patient is not always self-possessed, or he does not clearly understand the nature of the question you put. It is necessary to be very precise and very distinct in your questions if you wish to get accurate answers. Now you will say, how do I apply these questions to the list of diseases before you?

First question—Frequency of passing water.

There is no serious affection of the urinary organs, except one or two which I will name hereafter, in which there is not

more or less frequency of passing water. Thus the following is an exception: a man may have stricture of the urethra to a considerable extent; the stream may be narrow, still he may not for some years complain of frequency of passing water, although the symptom will appear sooner or later.

Now I wish you to observe the classification of urinary diseases placed before us. At the head of the list are the inflammatory diseases—inflammation of the urethra, of the prostate, and of the bladder. In all these there is frequency in passing water. Not necessarily, however, in urethritis, until it reaches the distant part of the canal near the bladder; and this is the second instance of exception which I referred to just now. I do not propose to discuss here the subject of urethritis as the opportunities of studying it occur not in the wards, but in the out-patients' room. I am now referring to this symptom of frequency of passing water as existing more or less in all these diseases at one time or another.

Firstly: in Senile Enlargement of the Prostate you meet with frequent micturition, and it is almost invariably more pronounced during night than in the day.

Secondly: in Chronic Prostatitis it is usually present to a small extent; in Cystitis it is necessarily a characteristic symptom. I name these together because continuity of tissue between the two organs is so complete, that the bladder can scarcely be affected without the prostate being more or less involved.

Thirdly: in Calculous diseases frequent micturition is a prominent symptom, and generally its degree is in proportion to the amount of bodily movement or exercise required by the patient's avocations.

Fourthly: Tumours, malignant and non-malignant, inasmuch as their presence induces irritation of the bladder, are of course attended by the same symptom.

Fifthly: in Pyelitis, and in almost all organic changes of the kidney, in Bright's disease, and in Diabetes, there is frequency of making water. Whenever the natural characters of the urine are altered before it reaches the bladder, the secretion produces irritation. This fact is worth dwelling upon for a moment, as it is not uncommonly overlooked.

Thus extremely dilute or watery urine is often regarded as

un-irritating ; on the contrary, it is not generally well retained by the bladder. The bladder is, as a rule, never so content as when it contains a healthy urine of average, or more than average, specific gravity. Some persons who are nervous, and particularly hysterical patients, often pass urine which is pale, or even colourless, almost like natural water ; and the bladder is always rendered more or less uncomfortable by it.

On the other hand, in Diabetes, not only is the character of the urine altered, but the quantity is much increased, and frequent micturition is the necessary consequence. And I may remark that it is chiefly in renal affections that increase in quantity of the secretion takes place ; while, on the other hand, suppression of urine is always a malady of the kidneys.

The second question has reference to Pain.

The attainment of precise knowledge relative to the nature and seat of pain will carry you far on your way towards a diagnosis.

In Prostatitis there is usually pain at the extremity of the penis, and felt at the end of passing water—less severe, but resembling somewhat that of stone ; occurring as it does as the bladder contracts, when empty, on the tender prostate.

In Cystitis, pain is usually felt before micturition, because the inflamed mucous lining of the bladder being unusually sensitive will not readily tolerate extension, which occurs as the viscus is expanded ; indeed the same thing happens to all mucous membranes when inflamed, of which a sore throat is a familiar example ; and hence it endeavours to get rid of its contents with great frequency, and so avoid the extension. The usual seat of pain is just above the pubes. When cystitis is acute, pain may be felt in the perineum also ; but in chronic or subacute cystitis it is suprapubic, and not at the end but at the beginning of making water, being mitigated by the act ; but when the prostate is inflamed also, there is a painful sensation at the end of the penis, at the cessation of the stream, as I have just said.

In Stricture of the urethra there is often pain about the seat of the obstruction, an idea of which you may obtain by a simple experiment. If, when passing urine with a full stream, you suddenly narrow the passage with your finger so as to diminish the stream to one-half or more, you will experience

an acute pain. When the obstruction is considerable this symptom may be severe ; but it is not so otherwise.

There may be pain with Enlargement of the prostate, inasmuch as this is frequently associated with chronic cystitis, when the pain is before making water, and not afterwards—differing in that respect from stone. The bladder has a strong natural impulse to get rid of its contents, and can do so but slowly, on account of the enlarged prostate, which stands as a barrier in the way. Hence during its first contractions, which expel but little urine, there is often severe pain above the pubes and deep in the perineum ; but when a third or a half of the contents has issued, the patient is relieved. When the pain is sudden and very severe before the patient can pass urine, he speaks of it usually as ‘spasm.’ This term almost always implies that the bladder is distended and urgently demands relief ; but the same pain may sometimes be felt when a bladder is emptied of urine, yet contains a foreign body the presence of which occasions severe involuntary expulsive efforts to be made.

Calculus in the urethra is not a subject to detain us. It obstructs the passage while impacted there, and its residence can only be a temporary one. Obstruction to the stream and pain are the two symptoms, and its presence can be verified either by the finger or the sound : at any rate there is rarely any difficulty about the diagnosis.

In Calculus of the bladder the pain is quite distinct in its character ; it is felt at the end of passing water, because, the bladder being emptied, the rough surface of the stone is left in direct contact with the mucous membrane, especially that which covers the neck of the bladder, unquestionably a sensitive spot. As soon as sufficient urine has trickled down into the bladder to separate the adjacent soft structures from the stone, relief is obtained. Then the locality of the pain is characteristic ; it is felt at the end of the penis, within an inch of it, about the base of the glans. Furthermore, the pain is notably increased by movement ; which in other complaints is more easily tolerated. If a patient travels in a jolting vehicle, or jumps from a step, or performs any rapid movement, he instantly feels severe pain, probably at the neck of the bladder, but also and chiefly at the end of the penis.

In prostatitis, inasmuch as the neck of the bladder is involved, there is usually some pain at the end of the penis, often felt at the end of micturition, which is one reason why chronic inflammation of the prostate is sometimes mistaken for stone.

With regard to calculus of the kidney, I have little to say here. There is pain, often severe, mostly variable, affecting the locality, right or left, not often both kidneys; there is tenderness also, and much increase of pain on movement. It is usually on one side only at a time, at all events, and it undoubtedly affects more frequently the left than the right side. The pain often extends along the hip and towards the groin of the affected side, although the calculus is fixed, and there may be no reason to believe it is passing by the ureter. But it is not to be overlooked that in some complaints of the kidney pain is sometimes felt only or chiefly about the bladder and urethra, and none at all is complained of in the renal regions.

No precise statement can be made about characteristic pain in connection with tumours. They may be situated in any part of the bladder; obstructing the outflow of the urine more or less; and, corresponding to the extent to which this occurs, cystitis will arise, and pain will be experienced.

The third question concerns the character of the stream itself. In stricture of the urethra it is of course diminished in volume, and this to an extent corresponding to the narrowing of the channel. Thus in very narrow stricture the urine may issue merely in drops, which only succeed each other with sufficient rapidity to form a tiny stream when great effort is made. If the narrowing is less considerable, the stream is twisted or irregular in form, and however small it is, the patient's efforts can accelerate it. But it by no means follows that stricture is present because such a stream is often observed. In enlarged prostate the stream is not necessarily small, but it is feeble, falls perpendicularly, cannot be much propelled by effort, and occupies more than usual time in the delivery. In calculus it is said to stop suddenly; but this is an error; it is exceedingly rare to meet with the occurrence, although constantly recorded as a sign in books.

The fourth inquiry relates to the physical characters of the urine primarily, and also to its chemical constituents. Now,

supposing that you have learned from the patient that he has frequency in passing water, pain at the end of the penis and at the neck of the bladder, and that the pain and frequency are aggravated by movement. You are already entitled to say to yourself, 'Perhaps the man has stone in the bladder, and I may have to sound him.' Two or three questions only have already sufficed to put this probability in your way, and you next interrogate him as to the character of the urine. See how this carries you a step further. We recommence our list as to this inquiry.

A preliminary remark, however, about examining urine. I do not propose to teach you at present a systematic mode of learning this; it is not my duty, and were I to do so you would only be repeating that which it will be your business to learn elsewhere, and I hope thoroughly. But there is this hint which I may at once give with respect to it. Whenever you want a specimen from your patient to examine, do not tell him to send you a bottle of it, passed in the usual way, or you will get a mixture often of doubtful value. What you require is the secretion of the kidneys, plus only anything there may be in the bladder; but you also have to avoid the presence in it of any secretion which originated in the urethra. Make a point of demanding that the patient should first pass two or three tablespoonfuls through the urethra, so as to sweep out whatever may happen to be there (which may be thrown away, or be put into a separate bottle), after which you will get a pure specimen for examination—at any rate one of which you will know the source. You will have the renal secretion, plus only whatever deposit may be produced in the bladder. Suppose the patient has gleet or chronic prostatitis: there will then be a quantity of muco-purulent matter in the urethra. If all this be carried into one vessel with the urine, how will you determine the different products, and decide, by the eye or by the microscope, what has come from the urethra, what from the prostate, and what from the kidneys? You cannot do it; but if you get rid of the source of error by flushing the urethra, so to speak, that is, by passing the first two or three tablespoonfuls into a wineglass, while all that follows is passed into a separate vessel, such as a tumbler, you will have in the latter a sample of urine that can be relied upon for

examination. If I felt disposed to indulge you with gossip, I could tell you stories of the gravest blunders committed by not attending to that simple point. I can at all events say that I have more than once known a patient treated for pyelitis whose only complaint was a profuse discharge from the urethra. He had sent the urine twice a week to his adviser for examination, in a bottle scrupulously made clean for the purpose, and because a quantity of pus was found in it, was treated during some months for pyelitis, having some symptoms corroborating that view. At length another observer discovered that all the pus came from the urethra, for when the urine was passed into two glasses, the first glass contained all the thick matter, and the remaining urine was clear and healthy; so that, finally, the 'pyelitis' soon disappeared under local treatment of the urethra. I do not know whether anyone else may advise you to employ that simple mode of determining this matter; but I will assume that in the future none of you will make such a mistake as that I have mentioned. I only know too well how necessary it is to call attention to this mode of examining urine, and how seldom it is practised.¹

Referring first to prostatitis, it is always associated more or less with shreds in the urine, which come from the prostatic part of the urethra; and if the urine is separated in the manner described, you will find that the whole of the thick matter will be in the first glass, while that remaining behind will be clear. How would it be with regard to calculus? You might have muco-pus in the first glass, but you would probably have more in the second from the bladder. It is not very common that there is calculus, unless it is small and recent, in the bladder without the presence of a little pus or blood, through irritation of the lining membrane of the bladder itself. Now and then, however, a man with a uric-acid stone of medium size in the bladder has clear urine. Hence we must sound such a patient if he has marked symptoms, although we know that the presence of stone in the bladder produces as a rule some little cystitis, and deposit in consequence. Then, on the other hand, if the patient passes

¹ See further remarks on this subject at the close of the lecture on Hæmaturia and Renal Calculus.

shreds of thick matter in the first glass, and the urine left behind is clear, and has symptoms like those of stone, rely upon it that it is a case of chronic prostatitis.

The character of the urine in one of the forms of chronic cystitis is well known. There is at the bottom of the vessel a thick mucilaginous deposit, which does not issue in a stream, but falls out in a mass. In another and very common form of chronic cystitis, it is simply cloudy, and deposits abundantly a light flocculent layer, but without any of the dense deposit described. In acute cystitis the urine is cloudy, there is a considerable deposit of pus, and some blood may be present.

In stricture of the urethra, unless chronic cystitis has been set up, there is no deposit from the urine; but there is usually a shreddy deposit in the first glass.

With regard to the *débris* of tumours found in the urine, the microscope sometimes throws much light upon their nature. This is especially the case with the large class of papillomata, portions of which may almost always be identified by a persevering search, an occurrence which of course decides the diagnosis. The *débris* of carcinomatous and sarcomatous growths are also thus to be found, but there is nothing sufficiently characteristic in the urinary deposit to form sufficient evidence by itself that any such tumour is present. This subject will be fully discussed in a later lecture.

Going upwards from the bladder, pyelitis, more or less chronic—is a disease in which the purulent condition of the urine is only one symptom among many others which must be observed before arriving at a conclusion. In all cases you will ascertain with precision if albumen or sugar is present in the urine by the appropriate tests. But do not make the very common blunder of inferring organic disease of the kidneys because you find albumen in the urine, the source of which is pus or blood, which may have issued from any part of the urinary passages. This subject will be fully discussed hereafter in the directions for the examination of the urine at the end of this volume.

The fifth question is, ‘Do you pass blood?’ and the answer will enable you to form an opinion on most cases—not quite, because in any case it may be necessary to sound before the diagnosis is complete. In prostatitis there is often

a little blood at the end of micturition, as in stone; in cystitis there is not necessarily blood, unless it is acute and far advanced; in stricture of the urethra there is not necessarily blood; and in enlargement of the prostate not necessarily. You meet with it often only as the result of instruments, but sometimes also as the spontaneous relief of a local congestion. The inquiry respecting blood regards chiefly the presence of stone and of tumour. Just as in phthisis a large proportion of patients have hæmoptysis at some time or another, so in about the same proportion of cases—say six out of seven—there is some blood observed at some time during the history of a vesical calculus. In tumour, hæmorrhage is always present, and in far larger quantity than that which occurs in stone, and it is also more persistent.

Sixthly, and lastly. It should always be matter of inquiry whether in the history of the case, recently or remotely, any signs or symptoms have appeared, to intimate that the kidney or its pelvis have been the principal site of morbid action. By the time you have arrived at this point in your interrogation, the patient will have alluded to them if they have been present, and little more is probably necessary to be asked respecting them. It is for the purpose of providing that there should be no oversight of such important facts, that this question is placed on the list. It comprehends an inquiry for pain, tenderness, and enlargement in the renal and related regions, and for the history of attacks of severe pain in the back, extending over the hip, towards the groin, associated with vomiting, and with changes in the urine, obviously simultaneous with the attacks and depending thereupon, &c.

I wish you to pay particular attention to these questions, because I shall assume acquaintance with them to underlie much of what I have to say hereafter. What is necessary to be added with regard to observation by the eye, by the hand, and by instruments, will necessarily occupy our time, as we deal with each particular subject in its turn; but I shall reserve further remarks on this important portion of the diagnostic scheme, dealing with it in general terms, for the material of our next lecture.

LECTURE II.

DIAGNOSIS (CONTINUED). THE SECOND PART: PHYSICAL
EXAMINATION OF THE PATIENT.

GENTLEMEN,—You will remember that at our first lecture I endeavoured to indicate how you might best apply your intelligence and your reasoning faculty, in order to obtain that information, the necessary preliminary to all successful treatment, a true history of the patient, a clear perception of his symptoms, and an accurate judgment respecting them.

To-day, I propose briefly to direct you how to seek, not for objective symptoms, but for physical signs; and for this purpose you are not merely to apply your reasoning powers, but to exercise your senses: sight, touch, hearing, and even smell. All these have not only to be used, but to be educated, cultivated to the highest perfection possible. An exquisite sense of touch has always been, as you know, the special attribute of an accomplished surgeon.

Thus by the eye you may often easily discern at a glance, as the patient stands before you, whether the bladder is distended or not. The lower part of the belly frequently shows a characteristic prominence in cases of retention of urine, whether acute or chronic, but especially when it is presented in the latter form. In ascertaining the nature of the swelling you are further assisted by palpation and by percussion.

The yielding elasticity of fluid is easily discriminated by practised fingers, as they gently knead and press the surface beneath them; a condition which contrasts strongly with the firm dull resistance offered by a solid growth. Then using the left index as a pleximeter, the quick hammer-like blow delivered at a right angle to the surface by the index and middle fingers of the other hand combined, establishes a distinct result, whether it be the wave-like impulse transmitted

by fluid, or the irresponsive obstructiveness which a solid tumour presents. The ear learns to appreciate the notes consecutively given out, whether it be the resonant note of confined air, like that of the bowel or stomach, or the dull thud of liquid or solid contents, together with the varieties which lie between those extremes—the intervals of a brief chromatic scale.

To the eye are visible dropsical effusions of all kinds: of the extremities in renal disease; the local inflammatory œdema of the scrotum, often hard to distinguish from extravasated urine; the latter sometimes to be differentiated by some small crepitation of gas in the cellular tissue, discerned by light finger pressure, but with due regard to the history of the case. The eye again should always be on the watch to recognise the hue of the patient's urine wherever it may be seen, so as to determine at a glance if the hue denotes the faintest florid blood tint, or the smoky tint which urine acquires from prolonged admixture with the blood; or whether the hue is that bright 'burnt sienna tint' which suggests a suspicion of liver trouble; although falling far short of the dark tone which accompanies jaundice.

By the eye, too, you examine the condition of the external meatus, and the surface of the perineum; seek for signs of abscess, fistulous openings and discharges; the enlargement of glands adjacent; the size and other characters of the stream of urine, the escape of gas by urethra, &c.

Then the sense of smell informs you whether the urine is ammoniacal and therefore mostly unduly retained; or putrid and probably loaded with bacteria; or, as occasionally happens, faecal from communication between the bowel and the bladder; to say nothing of slighter deviations from the normal state of the secretion.

By means of touch you attain a knowledge of the size and form of the prostate on introducing the finger into the rectum; or of tumours adjacent; of the presence of induration or fluctuation within reach of the finger; and of the degree of sensibility there. Also of the situation of an instrument introduced by the urethra; the presence of false passages or of fistulous openings leading into the bowel. The size and situation of a calculus, whether vesical or urethral, may be sometimes noted with advantage in this manner.

The use of instruments in relation to diagnosis has next to be considered. For this purpose the instrument is to be regarded as a lengthened finger, as a means of extending the range of tactile sensibility. The finger is too short and too large to search the narrow passages, and we provide a smaller substitute. But these considerations which I thus insist on indicate to you the mode in which the instrument is to be employed. It is not to make forcible entry: it is to obtain delicate impressions; it is an adjunct to the surgeon's sensory nerves, rather than a tool to convey muscular force. By an analogous proceeding, we may augment our power of vision by means of the endoscope, a matter we shall presently consider at length.

The first and the most simple inquiry needful in almost any case for which an instrument is to be used relates to the calibre of the urethra. To ascertain this a very flexible olivary-ended bougie of fair average size is the best agent. If such a one passes easily into the bladder, it is clear that not much obstruction exists in the form of stricture. You learn moreover that, if the bladder is to be examined, little or no difficulty need be apprehended in the use of the sound.

Suppose, then, a patient to present himself complaining that he passes urine with unnatural frequency; that he suffers pain at the end of micturition, pain on any considerable movement; and observes cloudiness of the urine, blood passing occasionally, but more with exercise—you may regard it as not improbable that he has stone in the bladder. But you cannot arrive at a certainty without employing an instrument. Almost all these conditions may arise from certain changes in the kidney and in renal calculus, and you cannot determine that important distinction unless you skilfully explore the bladder with a sound. When I claim great value for this mode of search, quite understand that I am by no means desirous that in the case of every patient who comes to you and complains of some frequency in making water, or pain in the act, you should at once regard the passing of an instrument as a natural or necessary panacea for his trouble.

It is sometimes laid to the charge of the surgeon, or if not it is sometimes suspected, that he is prone to become,

through long familiarity with instruments, somewhat inclined to abuse his power of employing them. Be that as it may, I have for many years invariably admonished you never to forget that they are only to be applied when absolutely necessary. I hold that an instrument, *per se*, is an evil—a very small one or a considerable one, according to the manner in which it is employed—and that it is never to be used unless there is good reason to believe that a greater evil is present, which it may mitigate or cure. But when your patient has the symptoms which have just been named, you will be doing him an injury unless you resort to it. Indeed you can scarcely do him a greater, than that of failing to verify the presence of a calculus when it is small. But the sound is equally necessary in order to ascertain the condition of the bladder itself, as to the presence of tumour, the growth into it of an enlarged prostate, whether it contains fluid or not in certain conditions, etc. Thus a patient may make water very frequently, exert all his force, be very certain that he has emptied the bladder, and yet be quite deceived. How can you determine his condition? There is a prominence above the pubes which you may reasonably believe to be a distended bladder; but it may be due to tumour or other cause. Having desired him to empty his bladder, you pass a catheter and observe the result. Neither you nor he could have known, without so doing, whether five ounces, twenty, or indeed forty, of urine, were left behind, for he may have retained even the latter quantity, although his own sensations led him to believe that he had previously passed every drop. We shall see more of this when we come to the subjects of retention of urine and enlargement of the prostate.

Lastly, I shall take the opportunity of showing you that the eye may be assisted by what is called the endoscope, which is simply an instrument which for many centuries has been habitually used by surgeons, in various forms, in certain cavities of the body—the ear, the vagina, the rectum—for the purpose of bringing reflected light to bear upon the interior of those cavities. For some years past this instrument has been employed for the urethra. It is at least seven and thirty years (1888) since I first saw the endoscope so applied. This was in the hands of Mr. Avery, of the Charing Cross Hospital.

It was a long tube, precisely similar to this which I hold in my hand, with certain arrangements enabling one to see deep portions of the urethra. He examined with it chiefly cases of stricture, but I do not think he looked into the bladder. After many trials the instrument acquired in his hands a certain degree of efficiency, but a premature death put an end to his career, and the method was no longer employed here. Various attempts had been made with the same object long before, but nothing was produced for some time much better than Avery's instrument. Then, at a later period, M. Desormeaux, of Paris, designed an endoscope, consisting of a tube similar to that first referred to, with considerable improvements. The various modes in which light is applied constitute the chief differences between the various kinds of endoscope. It is now about five and twenty years since I exhibited here, in this hospital, the endoscope of M. Desormeaux. Subsequently Dr. Cruise, of Dublin, made further improvements in the lighting, and so gave us a better instrument than the preceding. I therefore brought it here, and employed it in the wards under my care. It was used not only for the bladder and the urethra, but occasionally for the rectum. I cannot say that I think it was of much service; but it was, of course, desirable and necessary that in a great medical school men should see such inventions tested. We had also a small endoscope designed by Mr. Warwick, which was much less costly than the others, and answered nearly every purpose. After this no great change took place in endoscopic appliances until 1879, when it was reported that Dr. Nitze of Vienna, and Mr. Leiter, the celebrated instrument maker there, had devised a remarkable apparatus for examining the bladder and stomach. Having visited Vienna, I had the advantage of using this instrument in the Allgemeine Krankenhaus, with my friend Professor Dittel, the distinguished surgeon there. I found it difficult to use successfully, although far more efficient than its predecessors. Accordingly I obtained one, and exhibited it for the first time in this theatre in April, 1880, on living patients. It was a large and cumbrous machine, but by means of it an incandescent wire heated by electricity was introduced into the interior of the bladder. In all preceding instruments the source of light had been out-



side, and a ray was thrown by a mirror or a prism into the bladder, the observation being made only by transmitted light. The heat, however, arising from the incandescent wire rendered it necessary to provide a current of cold water constantly flowing in a minute channel round the instrument, from the outside to the extreme end of the sound and back again, otherwise the bladder would have been injured. This involved a very costly and complicated apparatus. But Leiter has recently succeeded in simplifying the machine, and now without difficulty a tiny Swan lamp, sufficiently small to lie

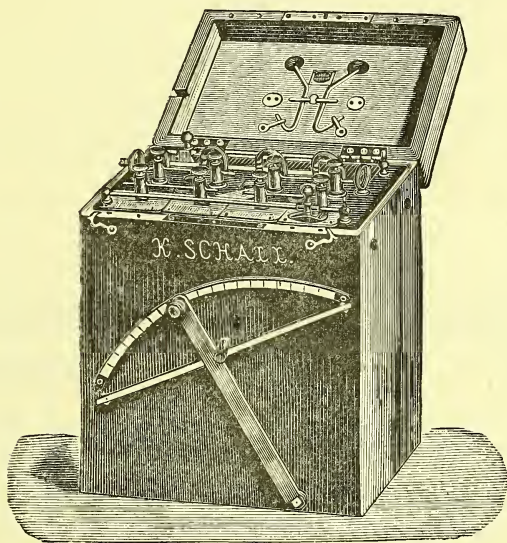


FIG. 1.—The battery used for the Nitze-Leiter endoscope.

within the apex of a hollow sound not more than No. 22 in size (French scale), can be introduced into the bladder. Moreover, no special process is required to reduce the temperature; but it is necessary to follow certain rules in order to ensure safety and to obtain good results.

In the apparatus now before you the electric current is supplied by a battery of four or six cells (a bichromate is employed) (fig. 1), besides which there are the connecting wires, with two sounds, one supplied with an opening to show the anterior wall, sides, and floor of the bladder, and one to show the posterior wall (figs. 2 and 3).

The first step is to move the handle of the battery, which sinks the elements of each cell into the exciting fluid and furnishes the current. The rheostat must then be adjusted so as to diminish the current as much as possible before making contact with the little electric lamp, which would be destroyed by too large a charge. The amount of light displayed will indicate if more is wanted, and if so you will move the slide until sufficient brilliancy is attained. The apparatus is now ready for action.

First, it is necessary that the bladder should contain fluid; the light cannot be employed in an empty bladder, as a considerable degree of heat is produced; a quantity not less than six ounces is desirable, eight or ten may be sometimes better.

Secondly, the fluid must be transparent; it is desirable to remove all cloudy urine, and more especially if any source of

FIG. 2.—Endoscopic sound (No. 1), for examining anterior part of the vesical cavity.

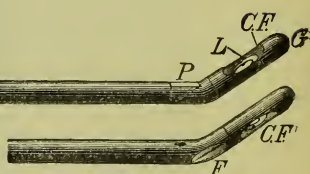
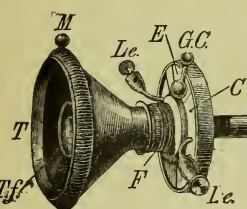


FIG. 3.—Ditto (No. 2), for posterior part of cavity.

hæmorrhage exists there, to wash out the bladder so gently as not to excite, if this be possible, any fresh flow of blood. Since the examination is, as we shall presently see, chiefly useful for the discovery of bleeding growths, or for ascertaining the fact of their absence, great care must be employed in every step of the process.

Thirdly, after injecting the fluid, sound number one, fig. 2, must be passed into the bladder before the circuit is completed and the light produced; otherwise injury might be inflicted on the urethra by passing the lighted sound along the canal. For the same reason the light must be extinguished before the sound is withdrawn from the bladder. The best way is to pass the sound before attaching to it the connecting wires, and to do this latter only when it has been placed in proper position.

Fourthly, when the beak of the sound is felt free within the partially distended bladder, it should be pressed in nearly as far as it will go, and then the wires attached connecting it with the current; after this the little handle is moved which completes the circuit, and then, if all is right, the light instantly appears. If the fluid is clear, the observer will, on looking through the external end of the sound, which contains a small telescope, obtain a distinct view of the anterior part of the vesical wall. This view is attained by means of a small prism situated at the angle between the shaft and beak, so that the rays of light are transmitted from the surface to the observer's eye. By gentle movements, which must be learned by practice, and cannot be verbally taught or described, different portions of each lateral wall and of the floor can be observed at pleasure. But the posterior third of the cavity is outside the sphere of vision through sound number one. Number two must be introduced, and be managed in the same manner as the former, if it is required, employing for it the little telescope removed from the first instrument for the purpose. Mind also that you do not forget, when the lighted sound is within the bladder, that the beak should not be permitted to rest at any spot for more than a few seconds in close contact with the wall of the cavity, lest it should be slightly injured by heat; it is prudent to keep the beak gently moving. And when the sound is removed from the bladder, should it be relighted, the beak must be placed in a vessel of water, otherwise the Swan lamp, or the crystal covering it, may suffer from undue heat. The light should never burn above one minute in air. If it is not wanted for a minute or two, turn off the current or put the light under water.

[A male patient, about 60 years of age, was now brought in under ether, whose case was a suitable one for exploration. Eight ounces of warm water were introduced into the bladder after withdrawing the urine. Seated between the patient's lower extremities, which hang over the end of the operating table, the lecturer introduced and lighted the sound, showing, after a minute or two, that the fluid was clear; no trace of blood had appeared, the mucous membrane presented a healthy tint of pale pinkish yellow, but an unusual amount of fasciculation of the muscular fibres was apparent, probably caused

by some obstruction of the prostate to the natural outflow. This indeed was very well marked ; no other morbid condition was present.]

You will naturally ask, in what cases it is likely that the instrument will be chiefly useful ? Certainly, before all others, in the case of those small bleeding tumours, respecting the presence of which, but more especially the extent of their development, it is often difficult to arrive at an accurate conclusion. I refer especially to the papillomatous tumours, the distinguishing character of which is their history of repeated attacks of hæmaturia during a considerable period of time. They may develop slowly for two, three, or four years before the loss of blood becomes considerable. They are often for a long time unaccompanied by pain or by frequency of passing water. The way by which you generally arrive at a positive knowledge that the bladder contains such a tumour, is not by sounding as for stone, because the sound is not capable of appreciating a small soft tumour. The mode of determining the fact is to search for a tiny shred of the growth expelled with the urine, and it is very strange indeed if you do not find one after the expenditure of a little time and patience, and are able to identify the structure of papilloma, which is quite characteristic. When you have found this you may be certain that there is more or less of the morbid product there. But you cannot tell whether you have to deal with one growth or two, or more, or whether it is large or small, because neither the sound in the bladder nor the examination by rectum will afford you any information whatever on these points. In such cases it has been sometimes necessary to make an incision into the urethra by the perineum in order to obtain these data, and I think this will still be necessary in some examples ; but in others, perhaps in most, we may now be able to ascertain the facts by means of this instrument. Still when, as not infrequently happens, the tumour is so vascular that the introduction of the instrument produces a considerable outflow of blood, it is useless to pretend that the endoscope will enable us to realise the number or size of the growths in the cavity. If, on the other hand, we succeed by very gentle manipulation in washing out the bladder, clearing it of all opaque matters, and introduce six or eight ounces of fairly clear water, then

I think the instrument will enable us to obtain the information required.

There is another class of cases for which the apparatus may possibly offer on rare occasions some service. We now and then meet with foreign bodies introduced into the bladder, of which, for some reason or other, a clear history is not always obtained. I have met with several instances of foreign bodies in my time, most of them broken catheters, and have rarely had any difficulty in removing them. In one only was it serious; it occurred in this hospital more than twenty years ago. A hairpin lay right across the bladder, so that I could not move it when seized by the lithotrite. I then did the high operation, and removed the hairpin with some difficulty. I found it lying transversely right and left, with its pointed ends embedded in the mucous membrane, so that it was impossible to remove it by the natural passage. Sometimes, as I have said, only a doubtful history is furnished; there is some reason for reticence, both in regard to the body supposed to be in the bladder, and the method by which it arrived there. I remember a case in the country in which a boy had introduced an ear of oats or rye, the spikes of which lying in the right direction ensured its rapid progress to the cavity. In another case in this hospital I cut out a piece of sealing-wax. The history of this was not clear, and we did not quite believe the story given; but sounding revealed the presence of a hard mass. I performed median lithotomy, removing a phosphatic calculus, with an inch of sealing-wax for its nucleus. I may say that I have twice removed sealing-wax thus; and also twice removed a hairpin. In cases of this kind, when you are uncertain as to the fact and desire further information, you may ascertain the nature of the foreign body by this instrument.

Then occasionally there may be a suspicion of sacculated calculus. This is a very rare condition, and should not be too readily suspected to be present. Yet here, too, the endoscope may sometimes throw valuable light—literally—on the situation.

How much it may be necessary to use the instrument for the urethra is a matter of individual opinion. I should say that it is very easy to use it unnecessarily. If, however, you

propose to employ it in any given case, it will be generally desirable first to apply a solution of cocaine, of 4 or 5 per cent., for from eight or ten minutes, in order to prevent pain. The urethra is a very delicate tube, and only now and then wants inspection. I do not think you ought to require the instrument for stricture, unless in cases of exceptional difficulty; for all ordinary cases are managed with the least amount of

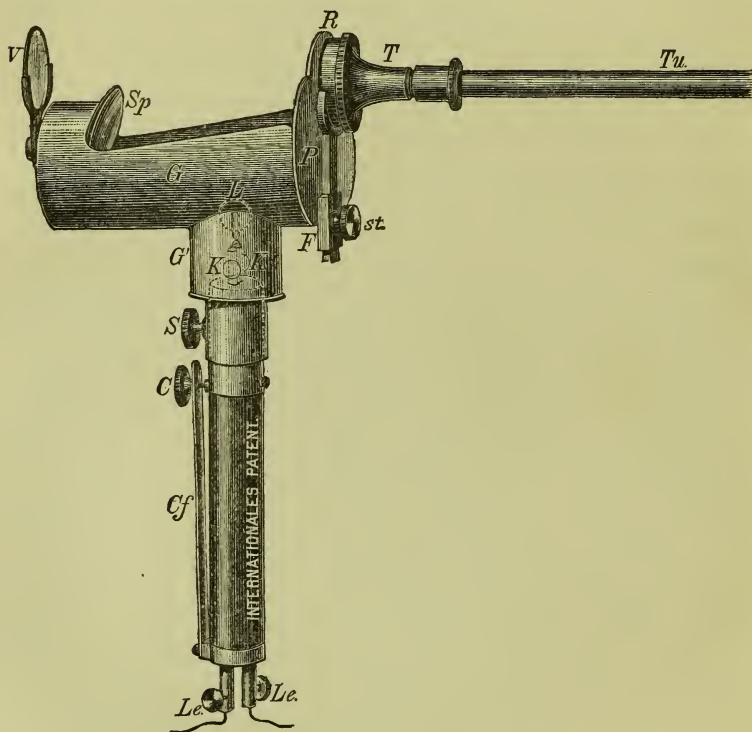


FIG. 4.—Apparatus for examining the interior of the urethra by transmitted light.

irritation to the passage when treated with simple instruments by a sensitive and intelligent hand. I have never yet, throughout my experience of urethral stricture, met with a case in which I have derived the slightest advantage by inspection. This, of course, refers to the old endoscopic appliances, and I will not say that the present may not be superior in this respect (fig. 4). But I know the urethra well enough to be aware that the introduction of a tube disturbs the relations of

the minute orifice, and is by no means so advantageous in practice as by theory it appears to be. The kind of handling which I have found invariably successful for the narrowest and most difficult stricture cannot be adopted when the canal is occupied by a metal tube. But there are other conditions besides stricture for which the endoscope may render some service. The passage is sometimes the subject of little papillomatous growths and congested conditions, which may be removed by an application, say, of some caustic, and you may ascertain the particular spot with ease, and touch it at the same time, by means of this instrument.

In conclusion, I think you will have already arrived at the conviction that it will not be necessary very frequently to employ the apparatus I have shown you in the diagnosis of vesical disease. For the fact is not to be altogether overlooked that its employment taxes the urethra and bladder more severely, for example, than the ordinary operation of sounding for stone, and should, therefore, not be resorted to without adequate necessity. In relation to the presence of papilloma and some other obscure conditions, it may sometimes render essential service; but do not regard it as an instrument that is in any case to be used for diagnosis, except as a special resource when other and ordinary resources have failed. Do not give up in any respect the simple means of prosecuting diagnostic research hitherto employed; but by all means keep it in reserve for certain exceptional cases when other usual methods have been tried and have proved unsuccessful. You may then occasionally find it a valuable ally. When, however, it fails, there is very little more hazard involved by practising the simple operation of exploring the bladder by the finger, which after all affords more trustworthy information than any impressions gained by eye observations through the endoscope. In the female this is accomplished by merely dilating the urethra. The easy, safe, and simple operation of 'Digital exploration,' which I have now so frequently employed, is the last procedure in relation to diagnosis to be named. It offers to the surgeon a means of ascertaining the actual condition of the bladder in all the unusual conditions enumerated above. Besides this, the small opening into the perineal urethra thus made affords a means of operating afterwards, if necessary,

in many of them, for the removal of the disease. This subject will be discussed at length in Lecture XXIX., on 'Digital Exploration of the Bladder,' to which all further consideration of it is postponed.

Lastly, it is not within our province now to discuss that large and important department of diagnosis which comprehends the various modes of examining the urine by means of chemical tests and the microscope. It demands a separate and practical demonstration, to be given at the end of the course.

LECTURE III.

ON SOME POINTS RELATING TO THE STRUCTURE AND FUNCTIONS OF
THE MALE URETHRA.

IN view of a consideration of the more important affections of the urethra, with which I shall naturally commence, I desire to depart from my usual habit a little to-day, and to speak more at length on a topic which I always allude to slightly, but not otherwise, because it is not part of my plan to teach anatomy and physiology here. But I find it necessary to complain of what I will speak of as the 'too mechanical method' of treating urethral diseases, which I think has been obtaining of late in some parts of the Continent, and perhaps in America. It has been my habit to caution you in this course of lectures against the tendency I refer to, but something more than this appears to me now to be desirable. I dislike to be polemical in this or any other subject, the practical side of which is so important; and I would infinitely rather, for my own peace and comfort, simply tell you what I think you ought to do in relation to various circumstances which come before you, and not also have to point out treatment pursued by others which I think you ought to avoid. However, I have the conviction that much of the treatment now in vogue is imperfect and less valuable than it might be, since it is founded on views of the urethra itself which are erroneous; or rather, I should say, it originates in a want of consideration which appears very widely to exist as to the nature and function of the urethra.

The treatment of urethral disease of which I complain has its origin in the notion that the urethra is a mere flexible tube, closed at or near its junction with the bladder by some kind of muscular apparatus, sphincteric or otherwise, through which fluids will pass indifferently in either direction. No

idea, however, can be more erroneous, and treatment founded on it must be defective.

At the outset, then, let me say that it is absolutely essential that you should have a tolerably accurate knowledge of the nature and functions of this so-called tube.

I draw for you on this board the kind of diagram usually supposed to represent the bladder and male urethra. This diagram has something to answer for in producing the erroneous views I refer to. It represents the urethra as a tube, and as more or less open (fig. 5).

Let me give you an illustration of my meaning, and not an unimportant one. I believe I am correct in stating that almost every patient who presents himself for treatment of a urethral discharge, when advised to use an injection, gets some such advice as this, when the manner of doing it is

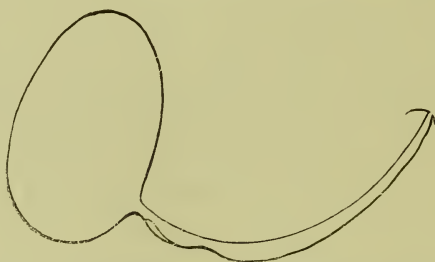


FIG. 5.—Anatomical diagram of bladder and urethra.

explained, as it ought to be, in detail: He is told to inject a certain quantity of liquid into the passage by means of a syringe of some kind, often one of considerable size, and he is admonished that, before he does so, he is to make pressure with the fingers of one hand on the line of the urethra, about four inches from the external meatus, lest the fluid should pass further down to enter or perhaps irritate the ducts which open into the prostatic portion, and occasion inflammation of the neck of the bladder or a swollen testicle. This idea is very far from correct; and such advice simply demonstrates that the person giving it is not really acquainted with the structure or function of the part he is treating. Want of thought originally has produced, and the influence of ancient tradition has perpetuated, the error which vitiates much of our treatment in its various forms.

First, let me assure you that the urethra is not a tube at all, in any sense in which we employ that word. It is not like a gas-pipe, or an india-rubber tube, or even a flaccid tube of any membrane whatever.

It is rather *a continuous closed valve, capable of transmitting fluids and solids in one direction only, and transmitting nothing whatever in the opposite direction, except in obedience to applied force.* Its length in the male makes us think of it as a tube, but this is a mere accident of sex. An inch or less is amply long enough for its urinary functions, as in the female; and all the length it possesses above that, although needful to constitute it a spermatic conduit, is quite useless *as a urethra proper*, and renders it liable to disease and accident—the price, and a heavy one, let me tell you, which the male pays for his specially distinguishing feature. In illustration of this, I have but to refer you to the difficulties and dangers associated with stricture, retention of urine, and calculus, which are comparatively almost unknown in the other sex simply because the outlet from the bladder is a ‘urethra’ and nothing more. But in the male this outlet is a long route or chink, traversing soft and most delicate vascular and nervous tissues, its walls or sides always firmly closed, and never opening except for a few seconds, during which fluids have to be transmitted from the body. Then, for a few seconds, it is distended more or less, and becomes a tube if you please, for this short time and this only, equalling perhaps, at most, three minutes in the twenty-four hours. All the rest of the time it is firmly closed, and not one drop of fluid can pass from the bladder. Of course, oozing of liquid which is generated in the walls of the tube, as in gonorrhœa, or which enters it by ducts, as spermatic fluids, may escape, but always, inevitably, if the passage is healthy, in the outward direction only.

I have next to observe that during these few seconds, when the valve may be said to assume temporarily the form of a tube, it is one marked by great deviations in its diameter; being, in fact, very differently affected at various parts of its course by the various structures which surround it. This fact has long been theoretically known, and generally thus recognised. I will show you illustrations of this statement

from the works of Sir Everard Home and of Mr. Guthrie, who made casts of the urethra in wax and other materials. This natural condition of variation in diameter when distended is scarcely less important than the condition of absolute closure which I previously explained. The annexed diagram is reproduced from Sir E. Home's work (fig. 6).¹

Having thus far illustrated briefly, although sufficiently for our purpose, the nature of this valvular passage, let us see how far the ideas which I want you to acquire relative to the urethra affect two important points in practice. First, that simple matter of making an injection into the urethra. You have to introduce a fluid for the purpose of therapeutic contact with the walls of this closed passage; you have to distend it, and some little pressure is necessary; not a single drop can enter, much less run down into it, unless the liquid is impelled by the piston, while the orifice of the urethra is



FIG. 6.—Diagram of urethra, from Sir E. Home, showing its extensibility.

kept carefully closed around the tube of the syringe introduced. The walls of the passage lying closely applied to each other become opened only by the pressure of the fluid driven in, and they are separated and distended just so much as the quantity employed for the purpose constrains them to be. Thus you may safely reckon, as the result of my observation, that a syringe containing one fluid drachm, or drachm and a half, is amply sufficient, and that it will distend the urethra for three and a half to four and a half inches. Even a half-drachm syringe sometimes suffices. Here is one of each size, and it is scarcely necessary to say that these small instruments are much more easily managed by a patient than larger and longer ones. But most patients, unless specially taught to use the syringe, never introduce any injection at all. Unless the orifice of the urethra is carefully closed while the act of injecting is performed, the fluid simply leaves the end of the syringe

¹ *Practical Observations.* By Sir E. Home. Vol. I. London, 1805.

and flows out by the external meatus. And thus it is that in every case after the injection has been properly made, the moment the orifice is unclosed the fluid is rapidly expelled by the contractile force of the urethra, and no appreciable quantity remains within. So much, then, for any fear of its running down to the neck of the bladder, and of its doing any harm there. Of course, if an injection is too strong—and in my opinion the solutions of metallic salts employed for the purpose in gonorrhœa and gleet are generally far too strong; and also if the methods of applying them by long and solid injecting apparatus are irritating—as I think they often are—the anterior part of the urethra may become inflamed, and extension backwards may easily take place; but that accident is no part of our subject now.

And now let me further say, that so far from your being able, even with the power of the syringe, to send an injection into the prostatic part of the urethra, you will not succeed in doing so by any ordinary force, unless you can at the same moment voluntarily relax the muscles which surround the membranous urethra, and so allow the fluid to pass—a thing perfectly possible with very little practice to accomplish. It is due to the same circumstances that you cannot inject the membranous part of the urethra itself without introducing an instrument sufficiently long to penetrate it. Much less can you inject the bladder except by passing a catheter into its cavity. In fact, this valvular passage stoutly resists all intrusion from without, and admits no fluid except in obedience to pressure which the muscles are unable to resist.

I must just remark, in order to anticipate a possible objection to my statement relative to the valvular action of the urethra, and its power to transmit bodies in the outward direction only, that it is well known that certain foreign bodies have been able to pass inwards when introduced by the external meatus. I refer to two typical ones, both of which have been occasionally known to reach the bladder after being fairly lodged within the urethra. I refer to an ear of barley or of rye, both of which you will recollect are bearded; and also to a common hair-pin, which is wedged-shaped. Either of these bodies, if completely introduced, and also in such a manner that the beards of one or the points of the other are directed

outwards, will traverse the urethra in the direction toward the bladder. These, however, you will doubtless at once see are not in the least degree exceptions to my statement. It was a schoolboy's marvel, in days now long past, to see how an ear of rye inserted at the wrist of his jacket sleeve would, with slight movements of his arm, although directed downwards, soon find its way upwards to his shoulder. If the arm were kept perfectly motionless, there would be no change of place in the ear of rye. So, when introduced within the urethra, the involuntary movements of the urethral muscles, designed to expel the intruder, act on the ends of the bearded corn, or on the ends of the hair-pin, and drive it on in the only direction it can travel—namely, inwards. I am not sure that it was necessary to mention this, but I have known the peculiar action of the two bodies named adduced as evidence against the uniformity of the urethral action referred to, while in fact it does but illustrate its existence. If the urethra submitted tranquilly to the intrusion, and made no expulsive effort all, the foreign bodies would not travel; as it is, they must move, and can only do so in one direction. Of course it is due to the natural function of the urethra that all other matters being without the structural peculiarity just described, and having more or less spheroidal or ovoid forms, such as gravel and small calculi, are expelled with facility, and that the morbid excretions in gonorrhœa, &c., always issue externally, and never go backwards to the bladder.

The second point of importance in which the structural function of the urethra, which I have described, should affect our practice, is associated with treatment of stricture of the urethra. I do but allude to this now, and shall reserve what I have to say on this head until a future lecture, when I shall enter fully on the subject.

LECTURE IV.

ON STRICTURE OF THE URETHRA AND ITS NATURE : AND ON THE
DIAGNOSIS OF URETHRAL CONTRACTIONS.

IN commencing this course, I shall take to-day the subject of Stricture; and I do so because, if not really one of the most common among urinary disorders, it is often supposed to be so. Among the many complaints of this class respecting which you may be consulted, perhaps none will be more talked of by the patient than urethral stricture. It does not follow, however, that stricture is really so common; in fact, it is much less so than many suppose. The term happens to have become a popular one for denoting the presence of some difficulty or undue frequency, or pain in passing water, and therefore when a man experiences any of these symptoms, he is very apt to say that he has stricture. Certainly, in five out of six instances in which persons do so, I find there is no structural change in the urethra, but generally only some temporary cause of irritation.

Then it must be confessed that that even amongst the profession there is some confusion as to the mode in which the word 'stricture' should be employed. It is said—and formerly I said it myself, because in my earliest writings¹ I was content to adopt the conventional classification then everywhere accepted—that there are three kinds of stricture—organic, inflammatory, and spasmodic stricture.

But subsequent consideration of the subject proved this division of it to be an indefensible one. It was clear that the term stricture could only be rightly applied to one form of urethral obstruction, viz., the permanent organic narrowing of the canal: and that it would save much confusion of thought,

¹ Jacksonian Prize Essay of the Royal College of Surgeons, 1852. By the author.

and render the rules of practice more distinct, to recognise this fact, and to regard that condition only to be stricture, viz., the 'organic stricture.' This, therefore, is what I here propose to do.

And what is Organic stricture? It consists in a deposit of lymph round the canal of the urethra at some point, which not permitting the canal to open to the pressure of the stream of urine, narrows the current to a greater or less extent.

This deposit is almost always produced by inflammatory action of a chronic kind, which has occurred probably several years previously, and may have affected any part of the canal anterior to the membranous portion, having generally commenced as gonorrhœa. The result of such inflammation in certain instances is, that lymph is deposited in the submucous tissues of the urethra, and gradually forms fibrous bands encircling the canal, which being almost constantly closed becomes in a manner ligatured thereby. The tissue thus formed has a tendency to contract. Stricture never affects the prostatic and membranous portions, but may be present in any part anterior thereto, notably the region of the bulb, and within a short distance of the orifice. In a few instances it occurs from inflammation caused by violence or caustics, or from mechanical injury to the urethra producing cicatrix, when of course any part may by such means be affected.

In common parlance we speak of stricture as a *contraction* of the canal; the use of which term is due to a popular and not very correct notion of it, as was demonstrated at our last lecture, although it answers well enough for mere practical purposes. You will therefore do well to call to mind in connection with the pathology and treatment of urethral diseases, that the urethra is not an open tube, except at the moment of its distension by an out-flowing current; it is always absolutely closed by muscular fibres, and only when it is habitually prevented from fully dilating to the stream of urine is it affected by stricture.

And this organic stricture is a permanent condition. Once acquired, it cannot be entirely dissipated by any known means. It cannot be removed by absorption, although the contrary has often been affirmed. You may dilate it, you may destroy tissue by chemical or electrical agency, and you may cut

through it ; but there, more or less, the morbid elements always remain. When a man once has organic stricture, he has it for ever. If any exceptions exist, their rarity is so extreme as practically not to invalidate the axiom laid down. Whatever treatment you employ, there is always a greater or less degree of rigidity in the urethral walls ever afterwards, and this increases with age. For all the fibrous tissues, as you know, become naturally less extensible, as a rule, in advanced years than in youth ; and this influence of age no doubt affects also those morbid tissues which limit the extensibility of the urethra in stricture, and is one reason among others why it so generally becomes less dilatable as the patient advances in years.

Now let us consider the nature of what have been termed ‘inflammatory’ and ‘spasmodic strictures.’

As regards the first, the obstruction is due merely to a temporary local inflammation of some part of the canal, which is then narrowed for the time. The patient is unable, as long as that inflammation lasts, to pass water, or at best with difficulty. An inflammation with this result affects only the prostatic part of the urethra, which is not, as you know, the seat of organic stricture. If you consent to call this condition stricture, you may as well say that the throat is strictured when it is partially closed by inflammation, and the tonsils are swollen. But you know that we only speak of stricture of the œsophagus or gullet in reference to an obstruction which is organic, when by some deposit the passage is permanently narrowed, and we never speak of stricture there under any other circumstances.

Next with regard to what is called spasmodic stricture. The urethra may be narrowed to a certain extent by spasm—that is to say, the water may be prevented from passing outwards from the bladder, because there is some irregular action of the muscles around the canal. But this affection also is only temporary ; it does not necessarily imply any organic change ; although sometimes its occurrence depends solely on the pre-existence of some slight organic contraction, yet the spasm in itself is by no means to be regarded as constituting in itself any form of urethral stricture.

But I will tell you what ‘spasmodic stricture’ often is.

The term itself may become an exceedingly useful excuse for the failure of instruments. It is, indeed, very often a refuge for incompetence. When you cannot pass a catheter, when you find it exceedingly difficult to introduce any instrument, and in fact wish to relinquish the trial, it is a convenient and decent excuse, and as such has always been so recognised, for the operator to say, 'There is spasm.' Indeed, I believe he mostly persuades himself that it does exist, although, in my opinion, the occurrence is an extremely rare one. 'There is spasm,' says he, 'now in the muscles, and it will be prudent at present to desist from further attempts to pass an instrument.' And no doubt when this is said it is so; better, equally in the interests of the patient and of the surgeon.

Now, I do not think that you ought ever to fail in passing an instrument because there is spasm. Spasm may prevent the urine from going outwards; I do not know that it ever prevents the instrument from going in. In most cases it is failure of the hand, not spasm of the urethra. Still I cannot deny that it furnishes a useful formula for explaining a partial failure—that is, has a sort of foundation in fact, and may sometimes be a more suitable communication to make to the patient than anything else when the instrument does not pass.

Let these remarks on the two matters named suffice, and understand that henceforth, when stricture here is spoken of, I shall refer only to organic stricture, in the sense already described. All the mechanical treatment which I shall have to speak of will have reference to that kind of stricture only.

Now, what are the symptoms of stricture? First, of course, there is the smallness of the stream, depending upon the narrowed state of the canal; and the stream itself is often flattened, twisted, or divided. Whatever the narrowing of the canal is, in that proportion there must be a narrowing of the stream. Still, it is not to be forgotten that the degree of narrowing varies much at different times in accordance with external circumstances, cold, errors in diet, and the like; one thing only is constant, the stream is always smaller than natural. Next, there is often some straining to pass water, corresponding to the obstruction of the passage; and usually accompanied by pain at the seat of stricture felt during the act of micturition; and there may also be a dull heavy pain

in the region above the pubes, if there is any cystitis also. Associated with these, it is common to have a little discharge from the urethra; indeed, it frequently happens that a gleet is the only thing which the patient notices at first, and the surgeon, finding that this is not readily cured by injections &c., uses an instrument and discovers some narrowing of the urethra. Frequency of making water, as I told you in the first lecture, is not always present, although it always is so when the case is severe and of long standing.

Supposing a patient to apply to you with all these symptoms, you will endeavour to see him pass water. He probably lays some stress on the fact that the stream is twisted or divided. Do not attribute much weight to this circumstance by itself, for a stream is often twisted when there is no stricture. This may be due to alteration in the external meatus; for as the stream issues from the passage it is modified by changes in the natural shape or extensibility of the external meatus; thus, after repeated inflammation there, the lips of the meatus are sometimes slightly thickened, so that the urine can only issue in a flattened and consequently twisted stream—a by no means uncommon occurrence. But if there is no other morbid change, however flattened the stream may be, and provided the absolute bulk or volume of the stream is not in the least diminished, there is no stricture.

The question of diagnosis by physical examination next presents itself.

Let me at the outset observe, that on almost all occasions of examining a patient for the first time with an instrument, one of tolerably full size should be selected, say not less than No. 9 or 10 of the English scale. Nothing is better for the purpose of ascertaining the absence of obstruction in the canal than a slightly curved English gum-elastic bougie, with a blunt and not a tapering end. It is neither necessary nor politic to produce an instrument, at first, of greater calibre. Even then the patient will probably remonstrate, and may very likely say, 'Why do you employ so large an instrument?' Soothe his fears by telling him that you do not propose necessarily to pass it, but mainly to learn what is the condition of the canal. But for this very reason you may commence by passing, as I confess I now generally do, when dealing with

one whose urethra has never before admitted an instrument, only a very flexible, tapering olivary bougie, about No. 8 or No. 9. My object is, of course, not to gain at once all the information I require, but to prepare the patient for a second instrument, and allay his natural fears and antipathies. If it passes easily I have at least scored two important points in the inquiry: the first is the proof that at any rate there is no very considerable narrowing to deal with; and secondly, I have—or it is my own fault—gained the confidence of my patient by demonstrating to him how easily, and almost painlessly, an instrument may be passed. I may now follow it with a second, two, three, or four sizes larger, and soon ascertain the urethral calibre.

To begin the examination with a small instrument, as some have advised, fails to obtain the information required, since such an one may pass through a stricture, if present, without detecting it; but if the large instrument goes easily into the bladder, you have the satisfaction of informing your patient that he has at all events no stricture worth mentioning, and you must look further for the cause of the difficulty.

But I have still to warn you that, in passing the instrument through a healthy urethra, it is quite common to meet with circumstances which may mislead you. I have spoken to you of error on the part of the patient, and I am bound to say that the surgeon who is not much practised in these matters may also be deceived. What are the sources of fallacy to which he is exposed? How is it that he sometimes fancies there is stricture when there is not? You may be placed in circumstances hereafter in which the opportunity of seeing this disease rarely occurs, and in such no great discredit attaches to a man who thinks he has found stricture where none exists. If, however, he professes to be an operating surgeon, such a mistake would be very discreditable. But any one who has not had much surgical experience may in using an instrument in the urethra encounter some unexpected difficulty, and may suppose, erroneously, that it is due to stricture. Now, although you may not all be operating surgeons, I wish no one to leave any course of lectures which I may give without knowing precisely what are the chief causes of deception, or of difficulty, in traversing a healthy

urethra, so that I may never hear that any of you have made the mistake I have referred to.

First, then, observe that close to the external meatus of the urethra is a source of fallacy to the inexperienced—I mean the lacuna magna. Next, at a part of the passage which is about five or six inches farther [a diagram referred to, fig. 7], the bulb joins the membranous portion, and the canal, from being naturally wide or dilatable, becomes less so; a condition not infrequently mistaken for disease. Lastly, there is a source of difficulty at the neck of the bladder. These are the three points at which persons may be mistaken in passing an instrument in the healthy urethra, and may form erroneous notions in consequence relative to the presence of stricture.

Now, I once more ask you to bear in mind that the urethra is not a tube, but merely a sinuous passage with soft, delicate, and vascular walls, lying in close contact with each other; so that nothing is easier, when traversing it with an instrument, than to encounter some obstruction in the folds or lacunæ of the mucous membrane. Thus, as I have said, it is quite possible to find obstruction at the very outset by engaging the point of the instrument in the lacuna magna, an occurrence which is sometimes extremely embarrassing to a beginner. Whenever, then, you introduce an instrument, let your first thought be to keep its point on the floor, so as to avoid that obstacle. You wish, of course, to pass it easily for the patient. Perhaps he has had instruments passed before, and you desire to succeed at least as well as the preceding operator. Now, there is nothing which a patient, who finds himself compelled to submit to urethral exploration, more appreciates, than the easy, almost painless passing of the instrument. It is at best a disagreeable operation, and if you perform it so as to cause less pain than he has previously experienced, you will probably retain your patient as long as he requires assistance of that kind. If your instrument stops, by getting into the lacuna magna and hurting him at the outset, he infers you to be a bungler, and perhaps will not ask your services again.

Now you see represented in this diagram the bulb of the urethra (fig. 7). The canal is more distensible at this point, in front of the deep perineal fascia, where the membranous portion, *b*, commences; being closed, indeed, in that

part, by a special muscle. Practically, therefore, it is much wider in the bulbous portion than it is at the membranous portion, and when the instrument arrives there, it is apt to meet with obstruction. This is the place where most false passages are made; the instrument being very easily pressed out of the canal below the urethra, since the tissues here forming the floor of the canal are delicate and distensible. The section of the corpus spongiosum is wider below than

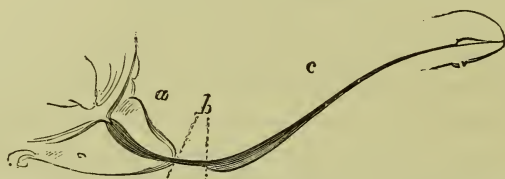


FIG. 7.—Diagram of urethra in natural condition. *a*, *b*, and *c* representing the prostatic, membranous, and spongy portions respectively.¹

above; the texture is soft and spongy. The urethra corresponds in distensibility to the soft structure outside, and although the instrument goes smoothly down to this point, it may not enter the membranous portion. Now, take care, at first, to have the point of the instrument so turned up as to avoid this lower part. Nothing is better calculated than a well-curved instrument to keep clear of that natural element

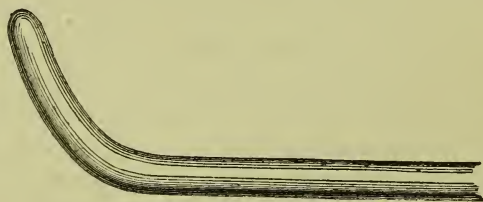


FIG. 8.—Bougie, with point turned up.

of difficulty. I have frequently made the following experiment in the out-patients' ward: Finding a patient who, although without obstruction in the canal, requires an instrument to be introduced into the bladder, I select a student who has never passed an instrument before, and duly instructing him

¹ The urethra should have been shown here as it really is, a closed canal; the line in the bulbous and prostatic portions having been made by me merely a little thicker to mark (*diagrammatically*) position and the character of dilatibility. This line has been somewhat exaggerated by the artist.

to proceed with the greatest care and gentleness, I say, 'Pass this bougie (a straight or slightly curved one) into the canal.' He passes it, and almost invariably, when he arrives at the membranous portion, the instrument stops. I then remove it, give its point this form (fig. 8), and the student immediately succeeds in passing it into the bladder. This is the form which is made prominent in the instrument called 'coudée' by the French, and a very useful one it is. Sir B. Brodie recommended in his lectures, more than sixty years ago, the plan of giving an upward turn to the point of a bougie for this very purpose. As the instrument goes in, the upturned point follows closely the roof or upper aspect of the urethra, instead of becoming engaged in the lower and more distensible part of the bulb.

The last obstacle is at the neck of the bladder, and so common is it, that you often hear of 'stricture at the neck of the bladder'—a thing which does not exist. There never was a stricture, unless, by some curiously remote contingency, a traumatic one, even in the prostatic portion. 'Stricture at the neck of the bladder' was nevertheless a household word some years ago, and even now one sometimes hears of it; but there is no such condition, and no ground whatever for the use of the term exists. The idea has arisen from the circumstance that, in using the catheter, obstruction is sometimes encountered at this spot, and 'stricture' was erroneously assumed to be the cause. When the difficulty occurs—and it may do so in a perfectly healthy urethra at any age—a well-curved or a 'coudée' catheter will almost invariably pass with ease.

Let me recapitulate briefly the three sources of natural obstruction or difficulty:—

First, the lacuna magna, which is avoided by following the floor of the canal.

Secondly, the narrow membranous portion at the bulb, which is avoided by keeping the point of the instrument well up against its roof.

Thirdly, an obstacle sometimes encountered at the neck of the bladder, also to be overcome by using an instrument the point of which is turned up or strongly curved. Such are the three natural impediments which an instrument may encounter,

and which by an uninstructed or inexperienced person may be easily mistaken for stricture.

So much for the management of an instrument in the healthy urethra. We now have to learn how to make the physical diagnosis of stricture.

For this purpose there are two separate modes to be followed, as there are two different objects to be attained, each of which is quite distinct from the other :—

There is, first, a simple examination of the urethra, to be used only for the purpose of verifying the presence or absence of any material deviation from the natural dilatability of the urethra.

And there is, secondly, a more minute and exact examination, in order to determine the precise condition of the urethra when it is already known, or there is reason to believe, that long-standing and perhaps considerable obstruction exists.

Now I need hardly say, that the first examination is one which is applicable to the vast majority of cases ; and that the second is necessary only in a few and exceptional cases. A very simple examination suffices to determine the question which so frequently comes before us, in the following form :— ‘ Do certain not very considerable derangements of the urinary function in the patient before us arise from organic obstruction, in which case they probably require instrumental interference ; or are they due to some other condition, for which instruments are not merely useless, but would probably be injurious ? ’

Before considering this subject, I feel compelled to express in general terms an opinion that there is a tendency at the present day to apply too freely instruments of all kinds to the urethra, and sometimes instruments also which are liable to injure it. This over-readiness to interfere with the urethra existed at the beginning of the present century. The mechanical school, as I shall take the liberty to term those who devise and largely employ more or less complex mechanical means for exploration, and for applying dilatation, cutting, or caustics to the urethra, was then in the ascendant. I think I could amuse, or at all events occupy, you for hours with the history of innumerable surgical knick-knacks which have been produced for such purposes in an age gone by. But our time is

too valuable, and I will content myself with one illustration only of surgical practice in this country at the era I speak of.¹

Following the period spoken of came the experience of mischief as its result, and a certain healthy reaction in opinion appears to have taken place. The practice of Sir Benjamin Brodie, who, having been a pupil of Home, became a very high authority during his long career, manifested great prudence, and his admirable teaching ensured similar views and practice among others for some time. I may be allowed to say, perhaps, that my feeble voice has also been raised against the abuse of instruments from the first day that I ventured to pen a line on the subject, some five-and-twenty years ago. And now I perceive a growing disposition to return to the state of things I have referred to. I note an increased tendency to discover stricture, and especially to undertake a considerable amount of operative treatment for strictures of the slightest kind, and sometimes in cases where, in my opinion, no strictures have existed. There seems now to be a school which has determined for itself a very high standard of patency in what we hear called the 'urethral tube,' and which is accordingly said to have—or, if it hasn't, that it ought to have—a calibre of so many parts, and very large parts, of an inch, or so many millimètres, as the case may be. Instruments of astounding magnitude are produced, and if one of them cannot be passed, with an ease which contents the operator, through the whole of the urethra, the unlucky patient is pronounced to be the subject of stricture; and

¹ The lecturer read some curious extracts from Sir E. Home's work, illustrating the practice of his period (*Practical Observations on the Treatment of Stricture*. By Sir E. Home. Vol. III. 1821.) In this treatise, which has long held rank as a surgical classic, the tenth chapter is headed: 'Cases of stricture in which the progress of the cure was uncommonly tedious, and attended with unusual difficulty; but which by perseverance ultimately got well.'

From an analysis it appears that the first case cited required eight, the second 'nine years for the cure.' In the fourth case 'the cure, through the imprudence of the patient, was protracted for twenty-four years, and yet got well.' The fifth 'required twenty-two years for the cure.'

But the eleventh chapter is devoted to still more serious cases. The first, given with much detail, sets forth that the subject was treated by Sir E. Home every year between 1800 and 1815, during which caustic was applied from about seventy to a hundred times in each year, the sum of the whole being 1258, during the sixteen years referred to, at the end of which time he died.

probably he is submitted to an operation by no means devoid of risk.

Let me place a specimen of the instruments I refer to before you. There is one which was brought to me by an American patient, which he was enjoined by his surgeon to pass regularly twice a week; and he had contrived to do so for a time, although the achievement was an act of great torture on his part and not seldom gave rise to an attack of urinary fever. The size of this solid steel dilator is precisely $1\frac{3}{4}$ inches in circumference! I never passed anything nearly so large into any urethra in the course of my life, not even for evacuating the largest débris in lithotrity. I have no gauge—although I have several, English and foreign—which approaches it in size. I took upon myself to release the poor fellow from his engagement to continue the use of it, and he gratefully left the machine in my hands, together with the written instructions from his surgeon to pass it thus. It had done him nothing but mischief, and he was much relieved by the complete cessation for a time from instrumental treatment which I enjoined.

Now, I cannot say that this fashion has, at present, been adopted here, but I know that it prevails to a considerable extent elsewhere; that it appears to have attracted some attention here, as all extravagant proposals do for a time; and I therefore raise my earnest protest against it. I feel it a matter of duty on my part to say what I think about treatment which I am perfectly certain neither you nor I would for a moment entertain the propriety of in our own proper persons; that is, if we entertain a due respect for the delicate and elaborate structure of the urethra which an intelligent acquaintance with it will ensure. Indeed, there are few structures more complex than those which constitute the male urethra. Formed of an internal membrane of great tenuity, surrounded by elastic and muscular fibres, interpenetrated everywhere with ducts, fine blood-vessels, and nerves; the whole surrounded in front of the prostate with one of the most elaborate of vascular structures, known as erectile tissue; it possesses also a sensitiveness to pain, in which quality it is not surpassed even by the conjunctiva; as anyone may learn for himself by passing the softest instrument he can find.

Finally, and more important still, it possesses another form of sensibility, of a much graver kind, which even the last-named membrane does not possess : I mean a strong tendency to arouse, in the entire nervous system, a state of excitement, evidenced by the striking phenomena of rigors and subsequent fever and prostration, when slight mechanical injury has been done to any portion of it. Now let this picture of the urethra as it is never be absent from your mind's eye when you put an instrument into it, and both you and your patient will profit. When, therefore, a young man consults you for certain troubles relative to which you desire to learn whether urethral obstruction be a cause or not, do not be tempted for an instant to adopt so unnecessary a course (to say the least) as the introduction of very large instruments, or instruments with huge bulbs at the end of them. For sometimes—indeed, not very infrequently—such an applicant is the subject of some chronic inflammation of the prostatic urethra or neck

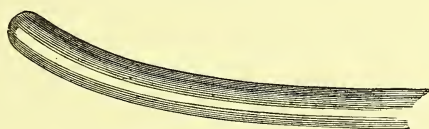


FIG. 9.—Blunt-ended bougie.

of the bladder after gonorrhoea ; and a certain way to make him worse is to pass a large instrument, or, indeed, to pass at this particular juncture an instrument of any size or kind. This is a subject which will be further mentioned in its place.

After this rather long digression, which the importance of the subject has rendered necessary, we return to the inquiry before proposed, viz. what is the simplest possible method of ascertaining the calibre of a hitherto unexplored urethra. Take, as above advised, a flexible English solid gum-elastic instrument curved at the end (fig. 9), or a French olivary bougie (fig. 12), about No. 19 or 20 French scale, and pass it very gently and slowly into the bladder. If it goes easily—above all, if it is withdrawn without being held, and slides out with perfect facility, take my word for it the patient has no stricture, and, *quoad* obstruction, wants no use of instruments whatever.

I dare say I shall be told by some one that it is quite

possible to meet with a urethra admitting without difficulty throughout its whole length a No. 11 bougie, and that nevertheless it is the subject of organic stricture, absolutely requiring treatment, and of a decided kind. Well, I do not deny the existence of that exceptional case; nor that if it does require treatment, it should probably be by internal incision. But such an example is very rare; and, further, no man who has the slightest delicacy of tactile sense in his fingers can fail to observe the difference between a No. 11 bougie sliding out with facility, and one which is grasped somewhat as it is withdrawn. This difference is always manifest in the two cases, and is, indeed, very notable. But supposing that the No. 11 has manifestly been stopped in its progress at any point, and you have assured yourself that it is not one of the natural obstructions to the passage of an instrument through the urethra of which I have already spoken fully, you are then to mark accurately what is the distance, by inch measure, between the point of obstruction and the external meatus. Next you will pass a smaller instrument of the same kind, which may probably pass a little farther; and so on, until you have arrived at one which does pass through the narrowing and into the bladder.

Now, with regard to the common exploring instrument, which consists of a long small flexible bougie terminated by a bulb of considerable size, nothing is more easy, especially with an unpractised hand, than to deceive oneself with respect to the existence of stricture. If not drawn out accurately in the axis of the passage, you may feel a check, and readily find what you believe to be a stricture in the most healthy urethra. And that is precisely what I am so anxious to guard you against; for, in the hands of designing persons, these instruments may be turned to most unworthy purpose. For men outside the ranks of our profession, or holding a questionable position on its outskirts, these instruments furnish the means of imposing plausibly on the unwary. That is an additional reason why we should be careful not to encourage their unnecessary use. I have for thirty years past used small bulbous instruments in metal for the diagnosis of narrow and confirmed stricture on which it is desirable to operate, but for slight stricture never; and I have protested against

their use on the two grounds already named: first, that for a simple and common case the instrument is quite unnecessary, and inflicts needless pain; secondly, that it is liable to deceive a young operator not too adroit or familiar with its use.

But let us now consider a case of more importance, namely, that of the patient who has a confirmed stricture, where the diagnosis has probably to be conducted with more attention to detail. I proceed as follows, making what may be called a 'survey' of the passage. I commence by passing the soft, blunt-headed English gum-elastic bougie as far as it will go, and when this stops, as it may do within an inch or less of the orifice, I make a note of the distance; and next, taking a smaller bougie of the same kind, find what will pass with tolerable ease through the obstruction met with. Very likely a No. 4 or 5 will do so, and it may then be carried farther to seek another check, which is not infrequently met with at about five inches from the orifice. Through this, after a trial or two, a very small gum catheter—say No. 1 or 2—may probably be passed into the bladder, enabling me to draw off some urine, and so to be assured of its position. I know then that the patient has, at all events, a narrowing near the orifice and another at the distance named. I may verify this at once with a bulbous instrument if I choose; but as long as the anterior narrowing exists, it is as well to postpone more minute research until this anterior stricture has been divided, as considerable narrowing at that part always requires to be. Such an one, indeed, is never advantageously treated by dilatation. Supposing the division to have been made, the No. 11 blunt-ended bougie is passed, and will detect any other contraction affecting the canal anterior to the stricture already observed at five inches from the orifice. If there is one, the stopping of the bougie will indicate its situation, and its precise calibre is ascertained by finding after trial what sized bulb will pass through it with gentle pressure, while the distance can be exactly read from the graduated scale in inches marked on the stem of the bulbous instrument. When withdrawing it outwards through the stricture, the obstruction will be again verified by the hand. But if the bougie has passed with perfect ease for five or five and half inches, the canal is sufficiently open thus far, and I have

arrived at what, in almost all such cases, is the only remaining stricture; for it is rare indeed, where a narrow stricture exists about that distance from the meatus, that another will be found beyond. This last has now to be dealt with like the preceding, and as we are speaking of old and confirmed cases, there is little doubt that the best treatment for both is internal urethrotomy also. How to accomplish that most perfectly will be discussed in my lecture on that subject.

A word or two about the bulbous exploring instrument. It should, in my opinion, be of polished metal mounted on a slender metal rod or shaft, and should be used in several sizes from a bulb of No. 2 up to one of No. 14 or 15 (fig. 10). No other material slides so easily and smoothly through the

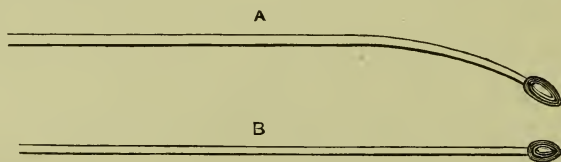


FIG. 10.—Straight and curved metal exploring bulbous instruments. The stem is marked with a scale in inches, commencing with the base of the bulb.

urethra; and the necessity for it is, after all, not great, so that to employ one which passes roughly or distends unnecessarily, is to pay too high a price for the small amount of information it may convey. Another form which I sometimes employ is shown below at fig. 11. Whichever model is used, the cutting instrument may be advantageously made to correspond in form with the bulbous explorer, as we shall see when the subject of internal urethrotomy is discussed.



FIG. 11.

Besides determining the situation and the calibre of a stricture, the bulbous explorer is undoubtedly useful in enabling you to ascertain the exact length of the contracted portion itself, although the sensation obtained by drawing out a

flexible bougie through the stricture is easily misinterpreted, and supposed to be due to a long obstruction when the reverse is the case. In reference to this, let me tell you, first, that considerable narrowing very rarely affects the urethra for any great distance. The passage is often partially implicated for half an inch behind and half an inch before the maximum point of narrowing—an important practical point in relation to operating; but the very narrow spot, which is what the exploring bulb indicates, is almost invariably short, within a quarter of an inch in extent. In the use of this instrument it is desirable to warn you that the mucous membrane of the urethra is extremely moveable upon the submucous tissues beneath it, and that this condition is apt to deceive you if you are not aware of it. A very little pressure in front, on entering the stricture, or from behind, in withdrawing the exploring bulb, if it comes rather tightly through, changes the situation of the contracted portion considerably in relation to its distance from the external meatus.

I repeat, then, if you have to deal with a recent stricture, such an one as you naturally intend to treat by dilatation, the introduction of a large bulbous explorer is wholly useless, only produces unnecessary pain, and tends to excite inflammation.

But in view of any internal incisions for a confirmed or obstinate case, the bulbous explorers are extremely useful in order to ascertain precisely where the narrowed points of the urethra are, and then it is not difficult to apply the cutting instrument properly to them.

The subject of treatment by dilatation will occupy our attention at the next lecture.

LECTURE V.

THE TREATMENT OF STRICTURE OF THE URETHRA BY
DILATATION, SIMPLE AND CONTINUOUS.

HAVING accomplished our diagnosis, we now come to the subject of Treatment.

Supposing a man has but one stricture, and that in the bulbous portion, or, if he has two, that the anterior stricture is by no means very narrow or resisting: what are we to propose to do for him?

First and foremost, dilatation—dilatation always—dilatation without exception, whenever it will succeed. It is always to be tried first, because it is the safest and easiest mode. If you find a man with a stricture which is very narrow, by no means think of operating until dilatation has first been fairly tried.

What is dilatation? A mechanical process of stretching the bands of organised lymph which surround the canal and have occasioned stricture there. It is often said to produce absorption of this tissue, which I shall not absolutely deny, but only say that there is not the smallest particle of proof to support the notion.

Now, we will suppose a case in which, as the result of exploration of the urethra, you have been able to pass No. 3 bougie rather tightly through the stricture and into the bladder, or better still a catheter drawing off a little urine, in order to be perfectly sure that the canal has been traversed safely. You will probably do well to say to the patient, 'That is enough for to-day; come again in two or three days' time for a larger instrument.' Then, on this second occasion, I advise you not to commence with the largest instrument previously passed. Having passed, say, Nos. 2 and 3 on the first occasion, you should now take Nos. 2, 3, and 4;

and on the third occasion, 3, 4, and 5; and so on; always beginning below the point you had attained on the previous occasion, making the smaller instrument a sort of *avant-coureur* for the larger one. This mode of treatment is denoted by the term, 'Simple Dilatation.' And here arises a question of some consequence. Having passed the largest bougie of the series, are you to leave it in the urethra for some minutes on each occasion, or should it be removed at once? Does any benefit accrue to the patient by permitting the bougie to remain in contact with the contraction, thus maintained in a condition of tension by the presence of the instrument? It was formerly the almost invariable custom to do so, and indeed sometimes to extend the term of contact to an hour or more. But recent experience has demonstrated in my opinion that nothing is gained by this practice, since it is apt to occasion irritation or even inflammation in the stricture. On the whole I am satisfied that the best plan is to withdraw the bougie within a minute after its entry. Thus you will find, especially when the stricture grasps the instrument rather closely, that the longer it remains, the more tightly it is held, and the more difficult and painful it is to withdraw. Not until the instrument has remained in the stricture some hours does this tendency to contract begin to relax, as we shall see by-and-by, in considering 'Continuous Dilatation.'

Next comes the question of the kind of instrument to be employed, and this is one of cardinal importance. Hence I shall begin by offering you a formula, easy to remember, which embodies a great principle, governing all mechanical treatment of the urinary organs, whether urethral for stricture or for enlarged prostate, for retention of the urine or for stone—a principle which will mostly decide for us the question of the kind of instrument to be employed. It is this:—

THE INTRODUCTION OF AN INSTRUMENT IS, MORE OR LESS, AN EVIL, NEVER TO BE RESORTED TO UNLESS A GREATER EVIL BE PRESENT, WHICH ITS EMPLOYMENT MAY PROBABLY REMEDY.

The introduction of an instrument of any kind into the bladder, even when the urethra is healthy, is a source of irritation more or less considerable, varying according to the rigidity and magnitude of the foreign body, and to the care and

skill with which it is passed. But the irritation need not be considerable; and in order to ensure this result I counsel you strongly to make a personal experiment, using a flexible olivary bougie to begin with. By no other means can you attain a certain kind of very useful knowledge. If you take my advice, you will be able to pass an instrument for another with much more facility than you ever can do without that experience. Indeed I do not hesitate to maintain that no man should pass an instrument for another until he has passed one for himself. And when he has done so, he will have acquired an appreciation of urethral sensibility, and, still more, of the best mode of dealing with it, which may prove of great value in relation to practice hereafter.

Let me ask you to suppose that in the management of your patient's case there is, to use a commercial simile, a 'debit and a credit side' to be considered, affecting every step in your treatment. You intend, beyond all doubt, to effect some real good—which is to be a considerable advance to the 'credit side' of the account; but you cannot do it without producing some slight irritation in order to gain your end—that is an entry on the 'debit side.' Be careful, then, that you constantly bear in mind the latter fact, and make it your business to diminish that 'debit' as much as possible. Do not pass an instrument unless there is some good reason, unless there is some evil, for the sake of curing which it is worth while to incur a little irritation. Acting upon this principle, you will choose such an instrument as you know by experience or otherwise to produce the least possible irritation.

And this leads me to the question of the difference between solid and flexible instruments. And here I ask your permission to offer a few remarks relative to a matter somewhat personal to myself. Many years ago I avowed a preference for solid instruments over flexible ones, which now you well know I recommend and mostly employ. Let me tell you how this occurred. Robert Liston, whose reputation as a great operator gave character and renown to this school above forty years ago, was accustomed to declare his predilection for silver catheters as compared with flexible ones of any kind, in characteristically strong terms. As one of his pupils and early

admirers, I at first naturally inherited his views and followed closely in his steps. But subsequent opportunities of observing, and especially the practice of the French school—above all my own personal experience—compelled me to arrive at the conclusion that, beyond all question, the flexible instrument is the best—if only you know how to use it—for the treatment of stricture, and for all maladies of the canal, whenever it is available. I am so certain of this, that I have no hesitation in saying that a great part of the success of any man who has much to do with such cases will depend upon his using flexible instruments instead of rigid ones. No patient will willingly allow another surgeon to pass for him a solid instrument if you have passed for him a flexible one as easily, as you may readily do. The latter gives so much less pain than any other, and produces so much less irritation. To continue my commercial simile—it puts so much less on the ‘debit side’ of the patient’s case, and leaves a correspondingly larger ‘credit;’ you get so much more of advantage, and incur so much less of disadvantage. I confess, then, to a considerable change of opinion since I published my first work on the subject; and I do this without the slightest shame or the slightest repugnance. I hold that the purpose of life in this world cannot have been achieved by us if we have never changed our opinions. You may rely upon it, with regard to any subject whatever, whether it belongs to the region of politics or of religion, or to our own proper profession, if we hold the same opinions at forty years of age as we did at twenty—and, perhaps, looking forward, I may say, if we hold the same opinions at seventy as we do at fifty—we have lived to very little purpose. It is an error to look for a life-long ‘consistency’ in matters of opinion from men who think for themselves, in whatever department of learning their studies may be. You must expect them to progress, or they will be bad teachers—just as I hope you are as pupils progressing now. I have ventured to make these remarks, because I know that expressions of opinion on more than one subject might be quoted from my teaching of five-and-twenty years ago which are not in harmony with what I am now saying. If I did not state this, you might ask me why, having formerly said so much in favour of the silver instrument,

do I now say so much in favour of the other. You have my reason : it is simply that I have lived longer and learned better.

There are two chief varieties of the flexible instrument, known generally as the English and the French. Inasmuch as the French instrument possesses more flexibility than the English, I often prefer it. Perhaps it is right that I should add a word or two here to what I have already said about the expressed opinion of surgeons forty years ago. There is no doubt whatever that all flexible instruments are better now than they were at that time. I show you an example of that most commonly used at the period referred to. It is called a 'bougie;' and very properly so, since it is literally a small species of wax-candle; and it is, in my opinion, a very imperfect instrument, at any rate for dilating a narrow stricture. You can bend it into any form by warming, but it is a very inferior implement to those which are generally used now. Nevertheless, the term bougie is still retained to describe the modern solid instruments, although they have lost all the characteristics of the original structure, and possess others of a different kind to which their superiority is due.

The gum-elastic or English flexible instrument, uniform in calibre throughout or nearly so, is valuable on account of one quality which it possesses, not found in the French instrument—i.e. it will preserve any curve, when cooled, which you choose to give to it under the influence of heat. If I wish it to possess a certain curve, I place the instrument in hot water, give it the curve required, then put it into cold water, and the curve is fixed or set.

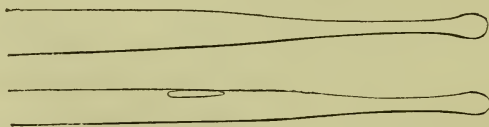


FIG. 12.—Flexible French bougie and catheter, with tapering and bulbous ends.

The French instrument is exceedingly flexible—a quality which is often of great utility. And it has another valuable character—namely, the peculiar form of its tapering point. Now, in passing through the urethra, a tapering point is often undesirable, because it is very liable to get into some

lacuna. It is an advantage if you can provide that it does not do so; and this is ensured by constructing a little bulb at the end (see fig. 12). The long tapering extremity, terminated by the bulb, escapes the lacunæ, and may be passed through the healthy urethra, or through one not much contracted, with great ease. Such an instrument as that may be passed by the patient himself without difficulty. The merest tyro can generally pass it in nine cases out of ten, so well adapted is it to pass with ease in any fairly healthy urethra. The 'olivary' form, as it is generally called, however, is only valuable when the material is very flexible, this quality enabling the terminal bulb to wind its way through the canal. When the material of which the instrument is made, instead of being soft and inelastic, inclines to be stiff, as too many of the English-made bougies and catheters produced in this form are apt to be, the olivary shape is not merely useless, but defective, and such instruments should be rejected.

Now it may appear to you at first sight to be counsel of a somewhat heterodox character to advise you, as I do, generally to forget, in passing an instrument, all anatomical instructions in relation thereto. Human anatomy is a subject which you are taught at the College, and it is all-important that you should study it thoroughly; but for the purpose of passing an instrument well, you will only be embarrassed by an endeavour to be guided by anatomical knowledge of the different regions. You need not then to call to mind the deep fascia, the membranous portion, or the compressor urethræ.¹ A solid instrument is especially dangerous in the hands of the mere anatomist, who forces it along in the direction he thinks right, as if all urethras were exactly of the same form, and did not vary as much as noses do, or other features. The assumed

¹ I am not surprised that exception has been taken by some writers to this passage. Notwithstanding which, I never felt the truth of it more strongly than I do to-day. No one ought to infer from it that I undervalue anatomy: it is the last thing I should desire to do. But the passing of an instrument well is not in any way an anatomical exercise. It is not an *à priori* proceeding conducted according to a knowledge of anatomical facts, but according to a deduction from large experience of the practice. Even healthy urethras differ considerably; but in exploring the passages, whether healthy or diseased, the hand is to be guided wholly by an intelligent appreciation of sensations communicated by the point of the instrument at the time of passing it, and not by anatomical knowledge.

value of anatomical knowledge used to be the pretext for preferring the solid instrument; it was said, 'You want to know exactly your anatomy, and to pass the instrument accordingly.' I pity the patient who has a solid instrument thrust into his body by a man whose action is guided only by a knowledge of anatomy. What you require is a trained and delicate sense of touch, enabling you to traverse the canal, and acquire as you proceed a perception of the route which the instrument ought to follow. Your hand is to be educated for the power of perceiving with facility the characters of the passage by means of the instrument within it; and rarely, if ever, are you to push a solid instrument in any given direction preconceived to be the right one. If you wish to achieve the maximum amount of dilatation and to produce the minimum amount of irritation, a light hand, and generally a flexible instrument, furnish the essential elements of success.

There is one other point to notice with reference to French and English instruments—I mean the gauges. The ordinary range of our number is from 1 to 12; although three or four higher numbers are occasionally used. Here is No. 12; and you generally consider, when you have reached that size, that you have completed the dilatation, although it is as well to go on to 13 or 14 sometimes. In England, we cannot be said to have a uniform scale; our measurements are somewhat arbitrary. The scale of one maker differs slightly from that of another, while that used in Scotland varies by one and a half from the English; so that the patient who has arrived at No. 12 Scotch, has reached only No. 10½ English. Our more exact neighbours beyond the Channel use the millimètre, and the number itself expresses the precise size, so that when the number of any instrument which has been used is named, the exact degree of distension produced is recorded. (See fig. 13.)

In the French scale, also, the range is far more considerable than in ours. It commences with a smaller instrument and ends with a larger one: besides which, the intermediate stages are more gradual. By permitting only a slight augmentation of size in passing from one number to another, dilatation is rendered more easy, and irritation is avoided. You may pass, for instance, a No. 4 English very easily, and a

No. 5 with difficulty, or not at all, while an intermediate size would afford you the means of progress. The French numbers 3 to 21 are about equal to our 1 to 12; which shows how much more gradual the scale is. No. 1 is one millimètre in circumference; No. 2, two millimètres, and so on; so that the increase in size is uniform as well as gradual. If I have a patient whose urethra will admit No. 21, I know that it possesses a calibre of twenty-one millimètres in circumference, and, of course, about seven in diameter. I advise you in this, as in other matters, to be cosmopolitan in your views, and to adopt improvements from all quarters.¹

I have told you that simple dilatation consists in passing a larger instrument every two or three days, until you reach the highest. In many cases all goes on smoothly from the

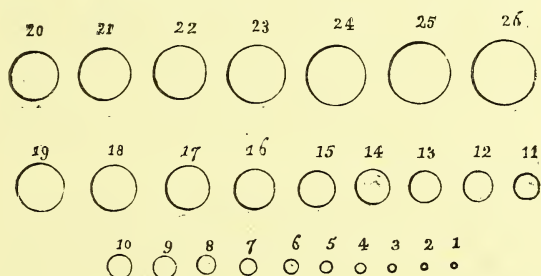


FIG. 13.—French or 'Charrière' gauge.

beginning to the end. Then you teach the patient to pass the instrument for himself, and he does so afterwards once a month, or once in six weeks, to maintain a sufficient calibre.

A patient who has not long been the subject of stricture may, as a rule, be successfully treated by simply passing these

¹ Taking the sizes employed by the chief London instrument makers as representing the 'English scale,' I have constructed a table in which the sizes of the French (Charrière) scale from 1 to 24 occupy the upper line, while the sizes of the 'English scale' occupy the under line; so placed that the relation of the two scales may be seen to each other. Note that the numbers do not generally coincide in situation—thus: the English 6 is between 11 and 12 of the French scale, but nearer to the 11 than to the 12, and so on.

Scale of Charrière	.	.	.	.	1	2	3	4	5	6	7	8						
English Scale	.	.	.	.	.	.	.	1	.	.	2	3						
Scale of Charrière	.	.	.	.	9	10	11	12	13	14	15	16						
English Scale	.	.	.	.	4	5	6	.	7	.	8	9						
Scale of Charrière	.	.	.	.	17	18	19	20	21	22	23	24						
English Scale	.	.	.	.	.	10	11	12	.	13	.	14						

soft flexible instruments, gradually increasing their calibre until that of the healthy urethra is obtained. But these very qualities of softness and flexibility, which diminish so greatly the disagreeable sensation when passing, and the chance of injury to the patient, constitute them inefficient when you have a case in which the hardness and resistance of the stricture are too great for their somewhat feeble power of penetration. What is the next step? What substitute do you employ? Are you to relinquish the process of dilatation, and think of performing an operation? By no means. You will now resort to firmer and less flexible instruments; and there are few which are more efficient or easy to pass at this stage than well-polished conical steel instruments, which are all the better when silver-plated. The sizes which I should recommend you are not to be small—indeed, none smaller than the following, of which I don't know that the first is not too small for any but very careful hands.

The first, say No. 5 (English scale) at the point, gradually increasing to No. 7 at about two inches and a half from it, as represented in fig. 14.

The next, No. 6 at the point, and No. 8 at the largest part.

The next, No. 7 at the point, and No. 9 at the largest part.

The next, No. 8 at the point, and No. 10 at the largest part.

The next, No. 9 at the point, and No. 11 at the largest part.

The next, No. 10 at the point, and No. 12 at the largest part; and so on to No. 16.

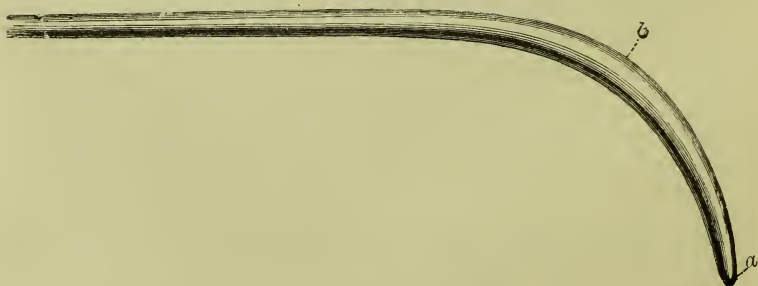


FIG. 14.—Metallic dilators, inappropriately called 'bougies.' *a*, point; *b*, largest part.

These conical metal dilators—I dislike to call them 'bougies,' a term so inappropriate for rigid instruments, and

which certainly, if retained at all now that the thing itself, the wax candle of our forefathers, is obsolete, should denote only flexible instruments—may be passed with great ease, owing to their polish and weight; while they can scarcely be surpassed for efficiency in the later stages of dilatation. I recommended them equally thirty years ago, and have in no way changed my mind about them. You may, however, be provided with something intermediate between the very flexible bougie and these metallic dilators; and many means for combining the flexibility of the former as to the point, and the stiffness of the latter as to the stem, have been contrived—such as gum-elastic, flexible metal, &c. In France, a stiffer bougie is produced by constructing the ordinary black flexible one with a centre core of soft lead wire, and it is a very useful instrument; but since this lead traverses the entire length, the terminal portion is rendered as firm as the shaft. Of late I have adopted a plan which I prefer to any of these, and for all sizes from No. 4 to No. 8 or 9 (English) it is perhaps as good as any. I have had a short and very soft lead stylet made, to be introduced at pleasure into the interior of the French conical bougie, and terminating in a fine point, which stops short about three or four inches from the end of the bougie. Here is a set of them: six in all. The following diagram will explain what I mean. A section shows the movable lead stylet in the interior, but is represented as extending too close to the end, which should be long and

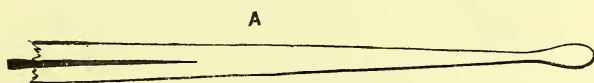


FIG. 15.—Flexible French bougie, with movable lead stylet.

flexible (fig. 15). Their maximum diameters are about $5\frac{1}{2}$, $6\frac{1}{4}$, 7, $7\frac{3}{4}$, $8\frac{1}{2}$, and $9\frac{1}{4}$ (English)—a series which may well intervene between the soft bougies and the metallic dilators. Capability to penetrate easily is ensured by the complete flexibility of the point, and the increased firmness of all the rest of the instrument. There is another ingenious way of combining these two qualities of flexibility and firmness, chiefly applicable to the middle and larger sizes, viz. by filling the interior with extremely fine shot, the 'dust' shot of the

sportsman. This adds to the weight of the bougie also, which is sometimes a useful quality.

We will now consider 'Continuous Dilatation;' a term which designates a mode of treating stricture by permitting the instrument introduced to remain in the urethra during a considerable period of time. There is a patient upstairs who is now undergoing this process successfully. You have tried, we will suppose, the simple dilatation, and have not made the amount of progress desired; or, perhaps, the patient's avocations may make it necessary to obtain speedy relief. In either case you may say, 'If you can remain ten or fourteen days in your room, not necessarily in bed, but on the sofa quietly at home, I can almost certainly dilate your stricture from the smallest number up to the highest'—by 'continuous dilatation.' In 'simple dilatation' the instrument is merely introduced and at once withdrawn; in 'continuous,' instruments are tied in, and allowed to remain for several days. This process, you will observe, is a very different thing from leaving a bougie in the urethra for an hour or two, a custom I have already spoken of with disfavour.

But there are certain rules which it is essential to observe in order to attain the end desired safely and easily.

I. The catheter to be tied in the urethra is always, if possible, to be one of gum-elastic, and of English make, which is superior for this purpose to the more flexible French, from its greater power to resist the destructive action of the urine. If, on account of the narrowness or tightness of the stricture, a small silver catheter only could at first be introduced, of course it must remain for a day or two until it can be replaced by one of gum-elastic.

II. In tying-in the catheter, care is to be taken that the end of it only just lies within the cavity of the bladder. An inch or two of catheter there is a source of irritation to the organ, acting, indeed, like a foreign body within it, as it is. There is no difficulty in accomplishing this object if the patient is placed in the standing position after the catheter has been passed, and the urine is permitted to flow through it. You will observe, by drawing it out a little while the urine flows, at what spot the stream stops; and then, reintroducing the instrument a little, you will mark the precise spot at which

it arrives when the stream again begins to flow, and there you will fix the catheter firmly by soft cord or tape, and plaster.

III. The catheter is always to be small enough to pass easily, so that even when first introduced it lies loosely in the canal.

These three conditions being granted, this is one of the safest and best modes of treating some strictures. There is a patient upstairs who has finished the process, and to-day the house surgeon tells me that he has passed No. 11, English scale, with ease. The man has been here only a fortnight, and has now not the slightest pain or frequency of making water. He says he is better than he has been for twenty years, and he came here in an exceedingly bad condition. Having been treated as an out-patient, and making no progress, I advised him to come in, and try continuous dilatation.

I may here show you what I think the best manner of tying-in a catheter. By the old methods, which involved bandages round the body, groins, and thighs, each movement of the body exerted some influence on the instrument—an extremely undesirable condition. The object to be attained is a method which permits free movement of the body without influencing, through the medium of the fastenings, the position of the catheter. The most simple and efficient method I can devise is to attach the catheter to the penis and pubic hair by means

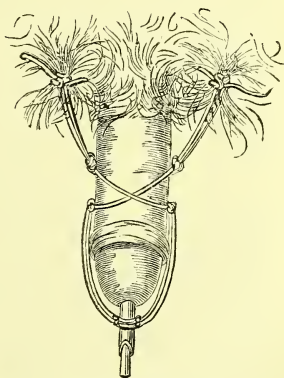


FIG. 16.—Method of tying in the catheter.

of soft twine or by 'bobbin,' which is a soft cord made of cotton and not of hemp, and does not irritate the skin. Two separate attachments loosely made in the manner shown at fig. 16 render the instrument secure, and permit alterations in the size of the organ to occur without causing discomfort. It is sometimes desirable to pass a turn or two of adhesive plaster round the body of the penis including the cords. Of course the patient is not allowed to indulge in much movement, and he requires very little in his chamber, or in a ward. But I

have known some persons, who have habituated themselves to the use of the catheter in this manner, to follow their usual avocations for hours, scarcely inconvenienced by the presence of an instrument thus fastened in its place. This is, however, extremely rare, and is not a precedent to be followed.

I shall now only repeat in reference to this process, that three conditions are necessary to success: you must have a flexible instrument; the point must not be far in the bladder, and above all it must not fill the stricture, because, let me beg you to observe, the process of cure is not a merely mechanical one; you do not require, as in ordinary dilatation, to distend the stricture as you might a lady's glove, but simply to expose it to the continued presence of a foreign body in the passage. If you leave in only a No. 1 for a sufficient length of time, you will be able, when you take it out, to pass No. 10, without using the intermediate numbers. I believe I was the first to demonstrate that curious fact; the knowledge of it at all events reached me by an accidental occurrence in practice. As a rule we do not leave so small an instrument very long in the urethra, because the stream of urine would soon carry it out, and it is desirable to put in a larger one in order to fill the canal a little more.

If, when it is necessary to introduce a larger instrument, one is used as large as the stricture will admit, and therefore requires pressure to introduce it, pain and irritation will be produced, and progress will be less satisfactory. Every time the catheter has to be exchanged for a larger, you are to avoid using one which passes with difficulty, and rather to take one two numbers less than the size which the stricture will absolutely admit. In continuous dilatation, as well as in simple dilatation, you are to adopt the plan which gives the smallest amount of pain and irritation to the patient, contributing, as has been before said, but little to the debit side, and as much as possible to the credit side of the case. Well, then, having retained catheters say some six, eight, or even ten days, according to the requirements of the patient, and having arrived at one of full calibre, the 'continuous' procedure may terminate by the removal of the instrument. But in order to ensure as large an amount of dilatation as possible, an instrument

sufficing to distend the stricture gently should be passed daily for a short time, and it should on each occasion be withdrawn without delay. After this the intervals between each resort to an instrument are to be gradually increased, the patient himself learning to use the bougie, and continuing to pass it at stated intervals in future. Ultimately it will be found that two or three numbers in size are usually lost during this stage of the proceeding, reckoning from the highest point attained by tying-in : thus, if No. 12 was so reached, you may perhaps maintain No. 9 or 10 ; an excellent calibre for a patient who commenced with No. 1, and that passed not without difficulty.

It is quite common to observe that the patient has a little fever during the process, but it is rarely considerable. A single rigor, followed by heat and sweating, is not a sufficient reason for suspending the treatment ; and it sometimes occurs after the tying-in has ceased altogether, and during the first or second day following, when the patient commences to pass water without the instrument. When long-standing organic disease of the ureter and kidney exists, as the result of old and narrow stricture, then continuous dilatation may provoke a severe attack ; but this is a condition in which all mechanical interference is somewhat hazardous, by provoking the occurrence of constitutional disturbance.

Cystitis and fever may be easily occasioned by the introduction of instruments which have been inefficiently cleaned ; that is to say, which are tainted by adhering matters acquired in previous use and not completely removed. Nothing is more essential in practice than the perfect cleansing of all instruments, especially those which are hollow or are capable of retaining minute portions of matter in some inequality of surface. For further hints and precautions in relation to this source of danger, see Lecture XXVII.

Supposing, however, that the treatment has been well supported, and that no such symptoms have appeared, the result of dilatation may nevertheless appear to be only temporary. As a rule, I have observed that the slower the process by which dilatation can be accomplished through the continuous process, the more certainly and rapidly will the contraction reappear. On the contrary, if improvement can be

very rapidly attained, the result will be comparatively more lasting.

There are therefore some cases in which all the advantages gained by the process are speedily lost. Clearly, some other method than dilatation of any kind will be required for these. This subject, which embraces the operative proceedings to be applied to the treatment of stricture, I shall consider in the next two lectures.

LECTURE VI.

ON THE TREATMENT OF CASES OF STRICTURE IN WHICH
CONSIDERABLE DIFFICULTIES EXIST.

You may remember, gentlemen, that at the last lecture we considered the treatment of stricture by ‘ordinary dilatation’ and by ‘continuous dilatation.’ You understand from the nature of the treatment itself that it was taken for granted that an instrument had been passed *into the bladder*. It is, of course, assumed that in treating a case by means of dilatation, whether continuous or simple, the instrument has passed completely through the stricture, otherwise the stricture is not dilated.

But all cases of stricture are not so easily disposed of. It often happens that at the first, second, or even third trial the instrument does not enter, or is not passed through the obstructed part; or it leaves the canal altogether and goes into a false passage. At all events, the instrument does not go through the stricture, and onwards, as it ought to go, into the bladder. And here I may remark that you are never to feel assured that the stricture has been successfully traversed by an instrument unless it has arrived in the bladder. No test is so complete as the appearance of some urine through the instrument passed, which must therefore for this purpose be hollow—in other words, a catheter. And nothing less than such evidence ought to satisfy, at all events, a young operator. Of course if a bougie is employed the test proposed is impracticable, and some uncertainty as to what has been done is inevitable.

Here, then, is a condition of difficulty which opens a new subject for us to-day. We have now to deal with more serious cases—those in which all your care, and all your experience and skill too, if you have any, are needed. It was said by

Liston, that 'the operation of introducing a catheter through what has been called an impermeable stricture is without doubt the most difficult in the whole range of surgical operations, and demands all the prudence, science, and skill of a master.'¹ That no doubt is a very strong statement, but it is the expression of his mature experience, since it appears in the latest edition of his work. You can scarcely have a higher authority for the opinion thus set forth, and my quotation of it here may be taken as my own endorsement thereof.

Now, there is one term employed in the foregoing quotation which is often used to describe stricture, to which I take a great objection, and I think the sooner it is expunged from the vocabulary of surgery the better. The stricture of which I now speak is that which has been called 'impermeable' or 'impassable.'

What is the meaning of the term impermeable stricture?

Let us consider, first, that urine always passes, however small may be the quantity, through every stricture, however described, except of course during a temporary crisis of absolute retention. Hence, such a crisis excepted, it is clear that 'impermeability' cannot rightly designate the physical condition or quality of the stricture; although it might in some cases be taken, in a cynical sense perhaps, to indicate some characteristic in the surgeon who had hitherto treated it! For, you see, a stricture may be 'impermeable' as regards A, who after repeated efforts to pass an instrument through it has failed; but not 'impermeable' as regards B, who coming afterwards may have succeeded. Therefore it is necessary to admit that, as a general rule, 'impermeable stricture' is a contradiction in terms. Stricture is a *narrowing* of the canal; it is not an obliteration of it, which is quite another thing. There must be an opening, and if there be an opening there must be room for an instrument; it cannot be 'impermeable.' It is only a question of the size of that instrument, and of skill or patience in the management of it. The stricture, as I have said, in its ordinary condition, always admits urine, more or less in quantity, to pass through it, and is therefore permeable. Hence I maintain, and have long maintained, the

¹ *Practical Surgery*. By Robert Liston. Fourth ed., p. 476. London: Churchill, 1846.

truth of the axiom first enunciated by Professor Syme, that whenever urine passes outwards through a stricture, an instrument ought with care and perseverance to be passed through it in the reverse direction. I advise you to believe in that doctrine—not that it is true as regards yourselves at the present moment, for I will assume that you have not acquired sufficient experience and skill to enable you to pass an instrument through a stricture in all cases. If you are able to do so, I can only say that you are out of place here, and need not come to learn. Without doubt it is exceedingly difficult to pass an instrument in some exceptional cases, but after a considerable amount of experience you will find that there are very few in which it cannot be accomplished. When you have a really difficult case of stricture before you, the success of your treatment will be materially influenced by a conviction that it is your own fault if you do not succeed, as it will, on the other hand, by your belief in the theory that there are certain cases which must be 'impermeable' to all surgeons. The man who holds the latter doctrine will be quite certain in some cases not to succeed; whereas, the man who believes that in all cases an instrument may be passed with time and patience will be very likely to succeed in all, and at all events he will succeed much better than the other.

'Impermeable' stricture is not heard of so much now as it was twenty or thirty years ago. That such a form of obstruction might frequently be met with was generally recognised then, and a particular kind of operation to relieve it was often to be seen in the hospitals; but I will undertake to say that it is much less commonly performed now. The operation consisted in passing a large instrument down to the stricture, and opening the urethra upon it from the perineum, and then carefully dissecting through the obstruction, or by it in some way, if the operator could not trace the contracted channel, so as to reach the urethra beyond, and it was usually not a very successful proceeding. It was acknowledged by all authorities at that time as the operation for impermeable stricture, or as 'perineal section.'¹ I have had occasion to

¹ I limit the employment of the term 'perineal section' to the operation when *no guide has been passed* through the stricture. When a stricture is divided by incision through the perineum, upon a guide previously passed into

perform it three times only in my life, two of these being instances of traumatic stricture; the latest was nearly twenty years ago, since which an exceedingly delicate instrument has invariably sufficed for the worst cases it is possible to meet with. And I believe the necessity for any other mode of dealing with the narrowest stricture to be excessively rare. I have already given Professor Syme credit for having first enunciated the doctrine that all strictures are permeable to instruments, and he always stoutly maintained it, without doubt to the great advantage of patients who suffer from severe stricture.

But you may have complete obliteration of the urethra, which, as before said, is not stricture. This is a very unusual condition; but it occasionally happens, and chiefly after injury in the perineum, as by perforation, or severe bruise, or any wound dividing or lacerating the urethra. If the opening remains pervious, and gives exit to all the urine, a cicatrix may follow, sealing the anterior opening of the divided urethra, and obliterating the canal for a short distance in front of the fistula.

I have now to consider the question, How are you to deal with a case in which real difficulty exists in passing an instrument into the bladder? Let a case be supposed in which attempts have been already made, perhaps by others, and hitherto without success.

First let me point out in what the chief mechanical difficulties in such a case might consist.

There are four.

1. Extreme narrowness of the stricture.
2. The stricture may be tortuous.
3. It may be complicated with false passages.
4. The urethra behind the stricture may be irregularly dilated and reticulated.

Sources of difficulty of another kind, not mechanical, also exist, and are two in number, hereafter to be considered, viz. :

1. The stricture may be very resilient, and liable to become rapidly narrower after attempts to dilate it; or even to close

the bladder, it is better, in order to distinguish this operation from the previous one, to speak of it as 'External Urethrotomy.' For brief sketch of both see pp. 86, 87.

and induce absolute retention of urine, as a result of instrumental interference.

2. The application of instruments may almost invariably give rise to an attack of rigors.

1. Let us consider the mechanical causes of difficulty ; of which the first is extreme narrowness.

In regard to this, the first thing to be done is to see the patient make water. The failures to pass the instrument may not necessarily have arisen from narrowing of the urethra, or from tortuosity : there may be a false passage leading out of the canal. It may indeed be that the urethra is altogether free from stricture. No greater mistakes than those which occur with patients who have little or no stricture are committed, either from the medical attendant not being familiar with the use of instruments, or from the presence of a false passage into which the instrument enters, so that it fails to reach the bladder. You are first, then, to see the stream of water, perhaps on more than one occasion, so as to estimate it fairly, and judge by it what sort of instrument is to be used. And always let the instrument correspond in size with that of the stream which you see. The instrument should correspond only in this way, however—it should be a little smaller than the stream. You know that when a current of water passes into a narrower passage than that through which it has been previously flowing, the current becomes more rapid, and when it again enters the larger passage, flows as slowly as before. Guided by this fact, and also by repeated observations, it appears to be quite certain that the size of the stream as it flows from the orifice is not to be taken as an exact measure of the calibre of the narrowest part of the canal. You should, therefore, select an instrument somewhat smaller than the stream. There is a patient in No. 10 ward, whom some of you have seen, who does not pass a stream at all ; the urine issues only by drops, a result due to the first cause mentioned—namely, extreme narrowness of the stricture. How very small, then, must the instrument be which is to traverse that channel successfully !

The first step to be taken with such a case, after having ascertained the situation of the stricture (see page 49), is to introduce very gently the smallest English gum catheter

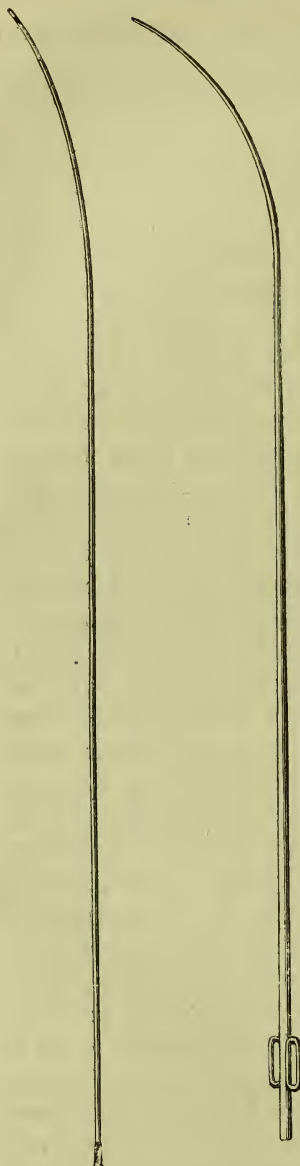


FIG. 17.

FIG. 18.

- 17.—Extremely small gum-catheter; a 'capillary catheter.'
 18.—Silver catheter, fine at point, shaft increasing in size to afford stability.

without a stylet, and try to insinuate it through the obstruction. For this purpose I have succeeded in obtaining some exceedingly small instruments, much smaller than any hitherto made.¹ This tiny catheter which I show you, capable only of containing a slender steel thread rather than a stylet, may be used either with or without it. The value of this little instrument, after its extreme tenuity, is its ability to transmit a drop of urine through its interior, and so assure you of its position when the bladder has been reached; an assurance, I need hardly tell you, of great importance. It is worth while making a careful and somewhat prolonged trial, and if you succeed, the instrument is to be tied-in at once, and the route secured—and it is a great triumph, let me add, to accomplish the first step on such safe and easy terms.

But supposing that, after patient trial both with and without the stylet, the slender catheter has failed to pass, we should now adopt a different mode of attack, and employ an instrument, still extremely small but inflexible, a small silver catheter which, unlike the flexible instru-

¹ Messrs. Weiss and Son have taken great pains to accomplish this for me, and have produced some slender, delicate instruments, much smaller than No. 1, which have been of great service. They are too small to take rank by numbers; so I have termed them 'capillary catheters,' to distinguish them from other small ones. (See fig. 17.)

ment, can be guided altogether by the hand. At the same time it is most important to remember, in connection with all small metal instruments, that no more dangerous weapon can be introduced than one of these, unless great care, delicacy, and gentleness are exercised; indeed, it is impossible to be too careful in employing so small a catheter as this is (fig. 18). You see how easy it must be with such an instrument to carry its point into one of the lacunæ, or into any false passage, or to penetrate the soft walls of the urethra, and even far among the tissues outside. Always remember that you are never to hold this slender catheter with a tight hand. You must not handle this with a view of pressing it firmly through any obstruction in its course; it is to be so lightly held as to slip through your fingers when undue resistance is met with, rather than incur the risk of wounding the urethra. I certainly cannot advise you to try such an instrument until you have had some fair amount of practice with larger ones. When a stricture is not only very narrow, but also hard or rigid in structure, no flexible instrument can, as a rule, be depended upon to pass through, although it should always be thoroughly tried at first. Observe that, as a general principle, I advocate the use of flexible instruments at the outset; but if you fail to pass them after two or three trials, in dealing with a very tight stricture, you must then resort to a small silver instrument.

Now, one word upon the subject of using force. *Under no circumstances whatever should force be used in the introduction of an instrument through a stricture or into the bladder.* That is the invariable rule for myself, and it is the formula which embodies my advice to you. Not so many years ago it was a matter of discussion how much force should be employed to overcome obstruction; at a more remote period, many surgeons regarded the use of instruments with considerable violence as legitimate practice in certain circumstances. Now I am perfectly satisfied, and I believe all experienced men of our day will tell you, that no force is to be employed. Of course, it is very difficult to explain what one means by force; but what you are to understand is, that no kind of weight or pressure is to be put on the instrument which can by any possibility carry it out of the canal; and very little force will

do that. *The greater the difficulty in penetrating the stricture, the less are you to dream of using force.* You will remember that the urethra is possibly of full size up to the point of narrowing, and hence it may be very difficult to find the opening. If you employ force to overcome the obstruction encountered, you will probably perforate the soft walls of the urethra on one side or the other, instead of insinuating the point of the instrument within the tiny orifice, and this done, the difficulty is greatly increased; because, when a false passage is once opened, the point of the instrument is much more likely to be caught in it afterwards than to pass through the strictured part.

I may here observe that, in using silver catheters of small size, an injection of oil is sometimes serviceable. Instead of oiling the instrument, commence by slowly introducing from two or three to six or eight drachms of olive oil into the urethra, holding the meatus closely round the syringe. It is easy to insinuate that quantity through a very narrow stricture. The surfaces are lubricated, and sometimes the urethra is slightly distended with the oil, so that, if you can cleverly retain it with the finger and thumb, you may then introduce the instrument when you have been unable to do so in any other way. The plan is not to be tried when there is much bleeding, or the tissues are torn.

2. A stricture may be more or less tortuous.

The narrow channel of the stricture does not necessarily follow the original and undeviating line of the healthy urethra. In other words, the constricted opening may be a little on this side of the urethral axis or on that, not necessarily in the middle. You may see this sometimes in the dead body; and you may infer it from experience on the living. When you have to pass a catheter through a very narrow or tortuous stricture, you should select one of two distinct systems of using an instrument, either of which may be successful. What I have to say here applies to the manipulation necessary in all cases of difficulty under the present and preceding heads; and I have reserved it, therefore, until now.

First: it being understood that a small instrument is employed, whether solid or flexible, it may be applied in a manner which can be fairly termed 'groping;' that is, by

carrying the point in any and every direction, with the utmost care, of course, until by chance it has entered into the stricture, as you may learn by the sensation of the point being 'held' or 'grasped.' For this purpose very slender solid instruments are made, of gum-elastic, of catgut, of whale-bone, and other similar materials, since they can be fashioned into instruments of rather smaller size than the slender gum-catheters I have just described. In order to add to the chance, as is supposed, of finding the orifice, there are some of the first-named material, the ends of which are formed somewhat into the shape of a corkscrew, or are otherwise made to deviate from a straight line (fig. 19). None of the instruments in this class have the advantage of being hollow so as to be capable of demonstrating their presence in the

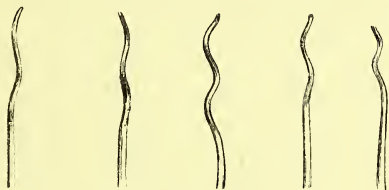


FIG. 19.—Small twisted bougies.

bladder when they arrive there; on this account I prefer, and always employ, the 'capillary catheter,' just named (fig. 17).

On the whole, I have not much to say in favour, either of the instruments described, or of the method of using them indicated. Groping at hazard for a fortunate introduction of the instrument is sometimes successful, no doubt; but it is a tedious mechanical occupation, requires little skill, and the practice of it will never develop further dexterity.

Secondly: there is another method of search, however, which is conducted on system, and this I much prefer, and chiefly employ. I advise you to adopt that, or any better mode you can devise, provided that it be a systematic one, and affords an exhaustive manner of making exploration and research for the orifice of the stricture. Some of you have seen me apply it to a patient in the wards to-day. According to this manner, you proceed on the principle of examining each side of the urethra in turn. We will suppose the urethra for our purpose to have four sides or aspects which

require examination—a roof, a floor, a right side, and a left side, all of which are more or less irregular and require to be traversed with the utmost care. You will lightly hold your slender silver catheter and delicately slide its point along one aspect first, say the upper or roof, from near to its commencement at the external meatus slowly down to the obstructed spot, and explore this carefully before you repeat the process on another aspect. If the orifice of the stricture is not *exactly* in the middle line—and we may fairly believe that it rarely is so—then there is one side of the passage which will more easily lead into the narrow way than another. These diagrams will show what I mean (fig. 20). If the instrument is slipped on this side [indicating the dilated side of the urethra shown in the diagram], it will probably not pass through the stricture; but if the opposite side is followed,

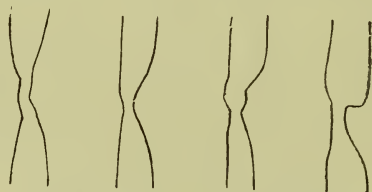


FIG. 20.—Diagrams of stricture.

the instrument has obviously a better chance of succeeding, because you see there is less obstruction on that side. Begin, then, by the roof. The roof is naturally the firmest part, the least likely to furnish obstruction in the way of ducts and lacunæ, and, by following it, you will be most likely to carry the point in. The floor, on the contrary, is the softest, loosest, and most spongy part; and will be most likely to yield to the instrument, and give way. If your first effort does not succeed, take the right side; if that fails, take the left; if that does not do, try the floor. I know no other method so calculated to help you to pass safely through a difficult stricture. If you are very careful, you may make the attempt in this manner for thirty or forty minutes without doing any damage; but if the patient suffers much, or bleeds rather freely, or if you are losing patience, give up the task, for under these conditions a false passage is easily made, and the difficulty may be considerably increased.

3. The existence of false passages leading out of the urethra is another serious obstacle to the introduction of instruments into the bladder.

Suppose a case under your care, in which you have reason to believe that a false passage exists. I will assume, of course, that you have not made it—you have been too careful for that—you are perhaps not the first surgeon who has seen the patient; some one else has seen him before, and may have made a false passage. Indeed, the subject himself may have been the author of it! There is a curious instance of an undoubtedly rare form of the lesion in the ward at this moment; in the person of a man who has, according to the history furnished by himself, used instruments habitually, and has succeeded in forcing one completely into the rectum! He has employed a No. 9 catheter, and treated himself for stricture without skilled advice or supervision. He is certainly an illustration of the old adage, sometimes, but not always, true, that 'he who treats himself has a fool for his patient.' By using the continuous employment of force he has succeeded, slowly and by degrees, in thrusting the instrument out of the urethra through all the tissues between it and the rectum. When he was in the out-patient room, he simply complained that when he passed the catheter into the bladder he never drew off the urine, but sometimes found fæcal matter in the eye of the catheter. The truth is, he never either entered the stricture or reached the bladder. I suspected the cause, and, after examining him, verified the condition described. Having, as you know, made two prolonged attempts, I carried a No. 1 silver catheter into the bladder to-day. You can easily conceive how the presence of such a false passage may add to the difficulty of passing the instrument, since he really had a very narrow stricture.

The principle which must guide our action in such circumstances is to be very careful to avoid the side on which the false passage is. A false passage commences usually on the floor, and no doubt for a reason already mentioned—viz. the fact of the structures below being looser and more delicate than those above.

When any patient has a false passage, a catheter may perhaps pass without difficulty until it has disappeared or

nearly so, and yet give issue to no urine. Hence has arisen the false notion that stricture may exist at the neck of the bladder. When the instrument has thus passed, a finger placed in the rectum will readily determine whether or no there is a false passage; for if there be one, the coats of the bowel only, which are very thin, intervene between the finger and the instrument, so that you feel it very distinctly. Moreover, it will very often be ascertained to lie not in the middle line, but rather to the right or to the left. But if the instrument is in the urethra, as it ought to be, the whole thickness of the prostate, not always very considerable, is perceived between it and your finger; always sufficient, however, to indicate that the instrument is in the right place. You will remember that it is generally in the bulbous portion that the instrument leaves the urethra and passes through the tissues under the prostate. When you feel in that situation the projecting line of the catheter, you are to withdraw it two inches or so, and then to pass it on again, keeping its point as close as possible along the upper part of the urethra, at the same time ascertaining by means of the finger in the bowel that the instrument is not again entering the wrong route. It will be very likely to do so, because it is much more easy to pass into a false passage than into the right one.

And when a false passage exists, it sometimes constitutes the chief obstacle to the introduction of an instrument; for, as I have before hinted, the stricture itself may be only inconsiderable, or indeed none may be present. The size of the stream will help to determine the point; and if, so far from being a mere thread, the urine issues in a volume equal to a No. 6 or 7 catheter, use a No. 5 silver one, the rigidity of which enables you to guide it, and try each side of the urethra successively, until you discover which it is that enables you to avoid the orifice of the false passage. Remember the result, and you have a key to the difficulty which will enable you to overcome it with ease on the next occasion.

To these hints about manipulation I have only to add my advice that you should never lose an opportunity, wherever you find one, of examining hospital patients by urethra and

by rectum, since practice is absolutely essential to instruct and cultivate your hand. You will often find a case of false passage in the wards, and I wish you sometimes to verify the position of the catheter when it is in the false passage; to observe, by introducing into the rectum your finger, how very little tissue there is between it and the instrument. On the other hand, when it is properly passed, you feel the thickness of the prostate intervening. You can only appreciate this by the touch, and will learn little more by talking of it.

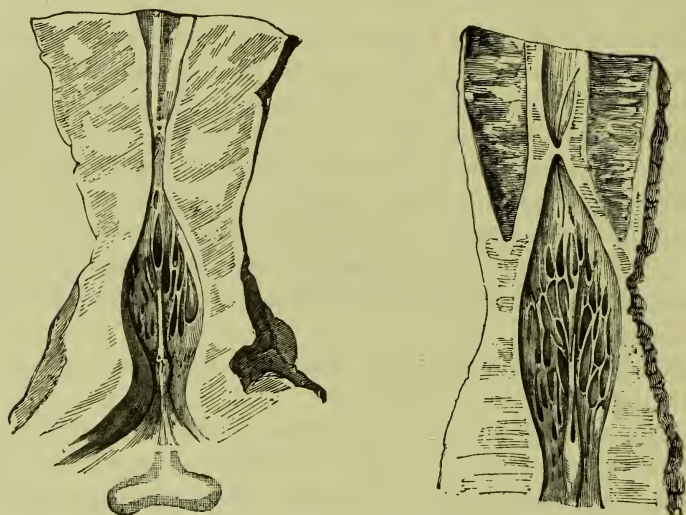
In connection with the treatment of a case of very narrow and difficult stricture, let me say very briefly, that if the patient be kept at rest in bed for a few days, his diet regulated, his digestive functions and the action of the bowels attended to, the chances of success at the subsequent application of the instrument will be increased. If possible, a few days' rest from instrumental treatment should elapse if you or others have already made several trials and have failed, or if, after one trial only, the symptoms have been aggravated. You will make your next attempt under more favourable conditions, if you choose a moment when the animal functions generally are well performed, and the signs of local irritation have diminished.

4. Difficulty presented by dilatation and reticulation of the urethra behind the stricture.

Suppose next that, following these hints, you have carried the instrument fairly through the stricture, you will be conscious of a hold or grasp of it by the contracted part, which is quite unmistakable. That is a sensation which you are always very glad to have, because, feeling the catheter 'held' by the stricture, you know the instrument has passed well into or even through it. But that very 'grasp,' which you are so satisfied to feel, makes it less easy to manipulate the point of the catheter when it has emerged beyond the stricture, and you may have a source of danger to encounter in the urethra beyond. Thus, the mucous membrane being sometimes reticulated from the presence of dilated lacunæ, the point of the instrument is liable to be engaged in one of those, and make a false passage. For it sometimes happens, as the result of long-continued fluid pressure and straining, that not only a few lacunæ, but the whole urethra behind the stricture is

dilated, and that its surface is so irregular, that much care is necessary in order to traverse it safely. Here, especially with a small instrument already grasped, you require all the caution you can command to carry it safely onward into the bladder. I show you two drawings taken from cases which exactly illustrate this condition. (Figs. 21 and 22.)

We have still to pursue the study of our difficult case one step farther. I will suppose that you have succeeded in introducing the catheter safely at last, and after much difficulty. By no means withdraw it. You will naturally conclude that, after incurring some trouble and even risk, it will be prudent



FIGS. 21 and 22.—Sections of urethra, showing very narrow stricture, and dilated and reticulated membranous and prostatic portions behind it.

to secure the advantage gained by fastening the instrument in the urethra. In these circumstances it is desirable to do so, even although the instrument is a metallic one; and you may allow it to remain forty-eight or seventy-two hours before removing it. Do not then be in a hurry to take it out, if the patient is tolerably comfortable. You will be excessively disappointed if you are unable to pass another in its place—a probable event if the catheter is removed too soon—in which case you might be compelled to wait some time before attempting a repetition of the difficult task; a circumstance which would be no less disagreeable to the patient. Keep the origi-

nal catheter in the bladder at least three days, and then you will mostly be able to change it easily for a small gum-elastic instrument. After all, it may happen at such a crisis, even to a surgeon of experience, that although he has once introduced a small instrument, either catheter or bougie, he is, after withdrawing it, unable to put it in again, or to replace it by another. There are some instances in which such a difficulty becomes the source of serious delay and anxiety. Under these circumstances a little apparatus made on the following plan has been occasionally found very useful. (See fig. 23.) A very fine flexible bougie or catheter with a small socket for a screw at one end (A *)—to which a stiff rod of similar calibre, and about 12 inches long (B), can be attached—is first employed, and when the small instrument has been passed, the rod is screwed to it, and a small gum-elastic tube (C) may be slipped over all into the bladder, and fastened there, when the rod and small instrument are withdrawn. On the next occasion of changing the instrument, the rod and small instrument attached are first passed into the bladder through the tube, which is then withdrawn and replaced by a larger one slipped over the rod which secures the route as before, and is itself again withdrawn.

From this point it will be easy to proceed by 'continuous' dilatation, as already described, increasing the size of the gum catheter from time to time. Having retained an inlying

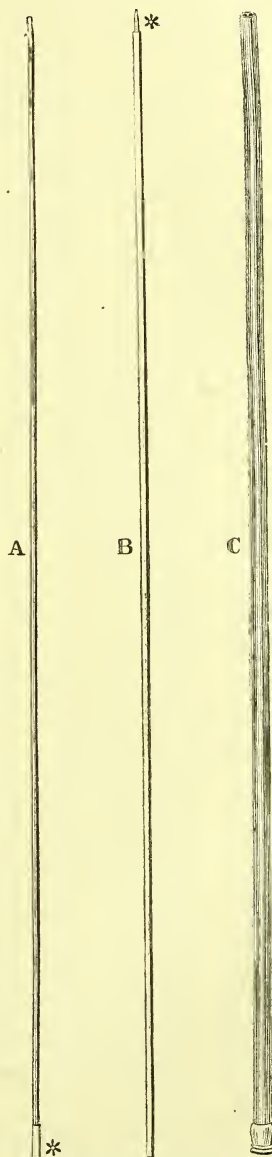


FIG. 23.—Oversliding catheters.

catheter, say the size of No. 10, you may rightly tell your patient that a great success has been achieved, that you will speedily relieve him from confinement, and will now only pass an instrument daily for a short period, and then at increasing intervals. He will learn to do this for himself, and keep the management in his own hands probably for a considerable time. This is what will happen in the majority of cases; the treatment having progressed without check. But there are not infrequent exceptions to the rule, and it may happen in a week or ten days afterwards that the stricture has rapidly reappeared, and sometimes even that its calibre has contracted to the size of No. 2 or No. 3; although this is rare.

Such a contingency presents a serious complication, a difficulty no longer of a mechanical kind, but consisting in a certain organic quality of the obstruction itself, which may be termed 'resiliency,' or strongly marked contractility.

Still less mechanical in its nature is another complication, which consists in the appearance of severe rigors when attempts are made to treat the stricture by dilating instruments of any kind.

This appears, however, to be an appropriate place for remarking that it by no means follows because the stricture has been very narrow, or has given you much trouble to overcome mechanical difficulty in traversing it, that it should therefore be a non-dilatable stricture; on the contrary, the dilatation may prove to be fairly permanent. But, on the other hand, you may have a stricture which will admit even No. 5 or No. 6 catheter easily, yet the patient may be unable to pass any but a very small stream, and this with pain and difficulty; and however carefully you may attempt to dilate, the advance will not amount to more than one or two numbers of the scale. You saw an instance of this condition in the ward the other day. Although a No. 6 instrument could be passed, the patient was the subject of almost constant retention, unable to empty his bladder by his own efforts until after I had performed urethrotomy, and then he was able to do so with ease and comfort.

We are now prepared to inquire in general terms what is the best course to be taken for the treatment of a patient who is the subject of undilatable or 'Resilient Stricture'?

I may commence my reply to that inquiry by telling you that the problem offered for your consideration has been found a difficult one through all past ages. The resilient stricture has been a source of grievous trouble, not only to patients, but to surgeons, from time immemorial. If you go back to the old records of surgery—some hundreds of years, indeed—you will find that these cases have taxed the resources of our art down to the present day. All kinds of agents have been used in order to overcome the difficulty. I cannot enumerate one half of the various substances which have been put into the human urethra for the purpose of curing it. I suppose the human stomach has been made to receive more abominable things than any other receptacle in or out of the human body. But if you consult the old surgical authors, or even some modern works, you will see that the urethra has been used nearly as unceremoniously and that is saying a good deal. Mercury, of course, first; then verdigris, savin and other vegetable irritants, metallic salts in all their variety—in short, everything that has the faculty to inflame, or that could be imagined to be disagreeable, has been used as an application to cure the unfortunate possessors of these resilient strictures. Then followed the long farce of ‘medicated bougies’ with—and without—the parade of secrets in their composition. At the present moment I need not tell you that some surgeons have been in the habit of applying, within recent date, bougies ‘armed’ with nitrate of silver and caustic potash—not at all mild remedies, either of them. Now I shall deal summarily with the subject of chemical irritants, as related to the treatment of stricture, and shall dismiss it with the following words: I believe them to be unnecessary, undesirable, and mostly injurious. Many modern surgeons, both in this country and abroad, have pronounced against the use of caustics and chemical irritants in the treatment of stricture, notwithstanding the widespread popularity they once enjoyed. I am bound to tell you they have still some advocates: what system has not? I shall not pursue that question further.

There is still another and a very powerful agent which has been employed at various times in the treatment of stricture: I refer to the electrical current. Upwards of twenty years ago in Paris a systematic attempt was made to disintegrate

the tissues of the stricture by applying such a current, not for the purpose of dividing them by its cauterising action, but by a slow and not painful electrolysis. It was said by its advocates there to be very successful, and one of the best known of these came to London to demonstrate the value of the procedure. Every opportunity of doing so was afforded him in this Hospital, but the result was certainly not encouraging. I saw all that was attempted; indeed the application of the current was made in my wards. Associated with the electrical treatment was a certain not inconsiderable amount of dilatation, inseparable from the introduction of instruments of gradually increased sizes, for the purpose of applying the current. Interest in the method ceased after this visit, and nothing more was heard of the electrical treatment of stricture until within the last few years, owing to its revival in America, from whence it has again reached us. I am not yet prepared to offer any opinion of the present attempt. It may be more efficient than the preceding, and more independent of the influence of dilatation, which undoubtedly constituted the chief, if not the entire, therapeutic power then employed. I am still prepared to find a new and valuable ally in the current, and its decomposing action, and that it may by improved methods be rendered available for the dissolution of the dense tissue which binds together the walls of the urethra. But a careful, prolonged and unprejudiced examination of the present proposals is necessary, and until this has been accomplished I suspend my judgment.

Then what have we left? Several other methods, all of which are mechanical in their nature: we may rupture, or overdistend, or cut these unyielding and contractile fibres, which constitute the stricture. Urethrotomy, as it is called—that is, division of the strictured urethra by some form of knife—is perhaps, all things considered, the most universally employed in such cases. Now there are two kinds of urethrotomy—external urethrotomy and internal urethrotomy: the external applied through an incision commencing from the surface of the perineum; the internal, by means of some instrument introduced and applied within the urethra.

The consideration of these must be postponed to our next meeting.

LECTURE VII.

EXTERNAL URETHROTOMY.—DISTENSION GRADUAL AND FORCIBLE.—
RUPTURE OF THE URETHRA AS AN OPERATION.

GENTLEMEN,—I hope you have clearly understood, in our studies together of urethral stricture, that the cardinal principle, regulating every mode of treatment up to this point, has been the absolute avoidance of every mechanical procedure partaking of the character of ‘force.’

To use the familiar language of common proverbs, we have endeavoured ‘to lead and not to drive;’ to work ‘by fair means, not by foul.’

But in all matters pertaining to humanity, there is invariably discovered at last, somewhere, a residue, not amenable to gentle methods: some intractable element that can only be dealt with by some forcible action. Even so it is with urethral stricture.

There are cases, as we have seen, uninfluenced by the persuasive methods of dilatation in any form; and they are by no means uncommon. Hence the employment of forcible distension, rupture, and even division with the knife.

The last-named agent has long been used, and certain methods of cutting through urethral obstructions were recognised as legitimate forms of operative surgery as far back as two and a half centuries ago. Our own Richard Wiseman, famous in the seventeenth century, gives the details of his exceptional experience in a bad case.¹ The French surgeon Colot at an early date, followed by Petit, Ledran, and others, subsequently, recorded similar operative proceedings in exceptional circumstances.

The experience of Hunter in this country at the end of the eighteenth century, followed by Sir C. Bell, Grainger of Birmingham, and Arnott, in the commencement of the present,

¹ Wiseman’s *Chirurg. Treatise*, 4th ed., p. 531. London, 1705.

laid the foundation for the proceeding known and widely recognised of late years as 'the perineal section'; a method applicable only to those cases in which the operator had failed to carry any instrument through the stricture by the urethral route. After this came the proposal of Syme to divide also externally an obstinate stricture although permeable by an instrument, when the contraction will not yield to dilatation although carefully and sedulously applied.

The recognised operations, then, included under the term External Urethrotomy are two in number: 'Perineal section,' as above defined; and Syme's operation on a grooved director.

1. Perineal section.—This proceeding is adopted when, after repeated trials, the surgeon has failed to pass any instrument through the stricture; and its object is to unite the urethra before the stricture to the urethra behind, and so establish continuity of the canal. In performing it, the patient is secured in the position for lateral lithotomy, facing a good light; a solid metal sound is passed down to the stricture, where, of course, it stops. An incision is then made from the external surface, usually the anterior part of the perineum, upon the point of the staff, so as to expose it freely, and with it the anterior face of the stricture. A loop of silk should then be carried through each margin of the divided urethra, directly in front of the stricture, to expose the canal to the light, and to mark the spot first opened, liable otherwise to be lost during the subsequent stages of the proceeding. It is through the minute orifice which ought to be found there, that you will endeavour to dissect by means of fine probes, and lay open the narrowed channel—generally not very long—until you reach the healthy urethra behind the stricture, and so ensure an uninterrupted channel throughout. This being fairly done, a full-sized gum catheter is tied in for two or three days, after which it is withdrawn, and a bougie is to be simply passed every two or three days, and the wound encouraged to heal. Mr. Wheelhouse, of Leeds, has designed and employed a special staff for this operation, which I cannot here describe, but which facilitates the proceeding, and should always be used, as these cases are sometimes very difficult to deal with, and demand all the resources of our art to render the operation successful.

2. External division on a grooved staff.—In this operation, which is that of Syme, a small grooved staff with a shoulder to rest against the face of the stricture (see fig. 24), so as to indicate with precision the exact locality of the narrowing, is to be passed into the bladder, and there should be a small channel through the staff from the groove, to permit a little urine to pass and show that the instrument has reached its destination. An incision about two inches long is then made in the raphé of the perineum, and the tissues are divided strictly in the median line until the staff is reached; the whole of the narrowed part is then freely divided on the groove of the staff; and the urethra should be incised nearly half an inch in front of the shoulder described, so as to ensure section of every portion of the contracting fibres, some of which are certain to escape the knife if the incision stops exactly at the shoulder and goes no farther. This is a point to which Syme called particular attention, and experience has shown the necessity of attending to it. When the operation is completed the staff is withdrawn, and a flexible catheter of full size is passed through the entire urethra into the bladder, and kept there two or three days. It is then removed and a large bougie is to be passed every few days. This proceeding is seldom adopted now, although much employed twenty or thirty years ago; but now other means have superseded it. It is usual to reserve it chiefly for cases in which there are old or large perineal fistulae which have resisted treatment and do not heal, since these can be advantageously laid open at the same time. (See Lecture XIV.)

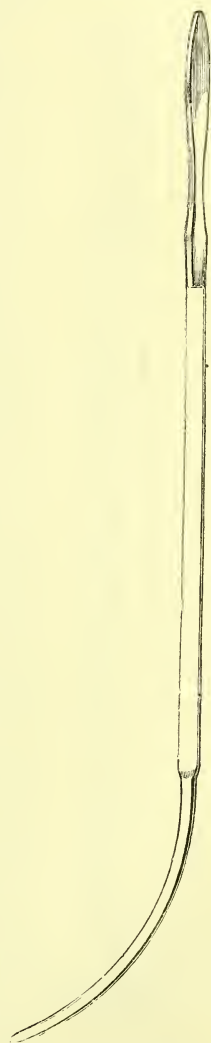


FIG. 24.—Syme's staff for external division.

We now take leave of operations by the knife in order to consider other modes of treatment by force. The great

advance in the arts of designing and constructing machinery of all kinds, which has marked the present age, was soon manifested in the workshops of the surgical instrument makers. New contrivances of all kinds for the mechanical treatment of disease and defects appeared, especially in Paris during the first third of the century. And among them new modes of treating stricture so as to supersede cutting—mostly by distending the contracted part from within outwards, were tried in numerous ways. And thus arose other systems of treatment, which have been distinguished, as Rupture, Distension, and the like. The method best known here, and which for some time was popular, is that termed ‘Rupture’ by its proposer, Mr. Holt, formerly surgeon to the Westminster Hospital. He adopted an instrument invented by Perrève of Paris above thirty years ago (fig. 25) to effect his purpose, but the manner of using it was not that of the inventor, who employed it only as an agent for simple dilatation, and by gradual steps. Mr. Holt’s method was to carry the instrument safely through the stricture, and then, instead of dilating gradually, to force down the largest tube at once so as to split everything that could obstruct the passage of the instrument. No catheter was tied in afterwards; and the results were often less severe than might have been expected. Further experience has, however, shown that the plan is by no means without risk, and that the relief afforded by it is often of brief duration. The impossibility of applying the distending force by this method to any portion of the urethra in particular, since the same amount of distension affects equally the whole when it is used, suggested to me some years ago a different proceeding which I termed ‘over-distending’ the stricture. I have never claimed any special novelty in it; since instruments for distending stricture from



FIG. 25.
Perrève's dilator,
from his treatise. (Paris,
1857.)

within outwards have been used in a variety of forms for about a century. Mine was a modification of some of these, and accomplishes a definite object perhaps more completely than before. The distending apparatus is composed of two blades, made to separate very considerably at one given point only, which is arranged to correspond with the site of the stricture (fig. 26); the sound part of the urethra being unaffected by the instrument. I have not used it of late years, because I have no hesitation whatever in preferring a free division of the stricture by a cutting edge, whenever operation is required; but when I did use it, the power, whether applied rapidly or slowly, was exerted, as I have said, only on the strictured part of the canal. For there is this fact, which in any case is worthy to be noted, and which I wish you to remember, namely, that the bulbous part of the urethra—the usual position of stricture—is also the most distensible part in the natural condition of the canal. Supposing the external meatus to be about No. 12 (English scale) in calibre, the bulbous urethra admits at least No. 20 or 24. Hence it follows that no kind of dilatation which is limited in extent by the size of the external meatus, more than half restores to its natural size the urethra which has a stricture at the bulb. It is on this account that I distended the contracted part to No. 24, or even to a larger size, or ruptured it, if I desired to do so, by means of the instrument in question. Formerly I often performed this operation, and it was attended with fair results, and it is still used in America. It may be suitable especially for a patient who has a strong objection to a cutting operation. But let it be remarked, that this instrument is to be used only for strictures

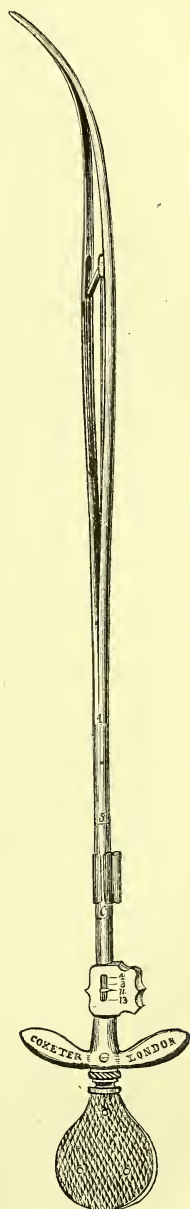


FIG. 26.—Distending instrument for stricture.

situated within the bulb. I have heard that it has been employed for those within three inches of the meatus: but these are always certainly better treated by complete division—that is, by internal urethrotomy. The operation with the distending instrument requires more care in the performance than does the proceeding by rupture, which requires neither skill nor caution when the instrument has been once properly placed. In performing the operation of ‘rupture,’ if the tube is properly introduced, a single impulse of the hand forces the tube through; and on that account it certainly presents a tempting facility in performance to the operator. I am not at all certain, however, that it is an advantage to the patient that an operation should be so easily applicable by an inexperienced practitioner. The consequence has been, and not so very seldom, that this proceeding has been performed, owing to such inexperience, on patients for whom no operation of any kind was ever necessary. But what is much more important in regard of these methods by rupture and over-distension is, that by neither of them is so long a period of freedom from recontraction to be anticipated as that which usually follows internal urethrotomy, when well performed. No doubt the latter procedure is more difficult to accomplish, and without doubt it requires, in order to be properly done, like most important surgical operations, a practised hand.

Thus far the motive for relinquishing dilatation, and for resorting to division or rupture in its place, has been referred to the assumed existence of marked resiliency, the result of the unyielding nature of the tissue constituting the stricture, so that the milder process is inadequate to overcome obstruction. And such is doubtless the actual condition present in the great majority of cases of old confirmed or obstinate strictures. But there are also a few instances of stricture in which another complication is more obvious, viz., the marked disposition to rigors which some patients manifest, as if due to special idiosyncrasy, on almost any instrumental contact with the stricture, however gently and skilfully applied.

Whether the latter theory is often correct or not, it is difficult to say, but there is no doubt that when the phenomena described occur, division of the stricture is often the safest

mode of treatment. And it is a matter of common experience that far less constitutional disturbance follows the cutting operation than has been produced by the preceding attempts by simple dilatation. It has fallen to my lot on several occasions to observe that a patient who has rarely had an instrument passed of sufficient size to dilate his stricture, however gently, without incurring an attack of rigors and fever soon afterwards, has had his stricture completely divided without any constitutional disturbance whatever. I have very recently met with two cases of patients suffering from what was for some time believed to be severe ague, and only through the discovery of some slight urinary symptom did it happen that I had to examine the urethra. In each case stricture existed, not considerable, but the simple diagnostic exploration of it was followed not merely by a rigor, but by recurring attacks during a week or so afterwards. In each case I at once applied a free internal urethrotomy, and no rigor appeared after the operation, or has ever done so since. These two cases occurred in private practice in 1887, and were observed by several persons besides myself. It is important to operate thoroughly, for incomplete division may arouse an attack; let the incision include the whole of the diseased tissue, so that a large instrument can be passed with perfect freedom, and no subsequent attack occurs. The question of treatment for this class, no less than that for 'resilient' strictures, leads the way naturally to a study of internal urethrotomy. The consideration of this I leave therefore to our next meeting, which we shall devote entirely to the subject.

LECTURE VIII.

ON INTERNAL URETHROTOMY.

GENTLEMEN,—During the last few months many cases of stricture of the urethra have come under our notice, of which the most severe and obstinate have been admitted into the wards. I have employed for several of these cases the operation of internal urethrotomy, because throughout my experience I have found nothing so efficient, so safe, and so certain. I by no means say any kind of urethrotomy. Anything short of complete division of the obstructing tissue is an inefficient operation. Overdistend these strictures, or tease them with dilatation in any fashion, and they are sometimes rendered more than ever unmanageable, while a prolonged constitutional disturbance of a severe kind, as you have sometimes seen, follows the interference.

For the operation of internal urethrotomy we have numerous instruments and systems from which to choose: their name is Legion. Modification after modification has been made of the earlier forms of urethrotome, both by instrument makers and by surgeons, with the view of accomplishing more perfectly the original object which most of them have sought, viz., the ability to divide easily, and more or less freely, the constricting tissue which narrows the urethra.

Before considering these, I may state that the situation of a stricture is an important element in relation to the applicability of internal urethrotomy of any kind, and also as to the need for it as a mode of treatment. Thus:—

1. A stricture at or near the external meatus is always extremely undilatable, while at the same time it may be divided with the greatest ease, precision, and safety.

2. A stricture existing in any part of the anterior three or four inches of the urethra partakes, also, more or less of the

intractable quality named, and may be cut with almost as much facility and safety as those in the previous class. As a rule, it may be said, the nearer a stricture is situated to the orifice of the urethra, the more necessary it is to treat it by incision, and the safer it is to do so.

3. Strictures in the bulbous part of the urethra, which may be considered as generally ranging between four inches and five inches and a half from the external meatus, are more amenable to dilatation than those of the preceding classes. But when necessary to cut them, it is easy and quite safe to do so as a rule, although it is somewhat less so than to cut those in the preceding class; the difference being due, no doubt, to the larger amount of erectile tissue about the bulb, as compared with the anterior part of the urethra. Bleeding, therefore, may be more considerable, and other risks, such as they are, more liable to be encountered.

In treating this subject, let us first deal with the strictures situated at or near to the external meatus of the urethra.



FIG. 27.—A small bistouri caché.

The instrument usually employed for the purpose of dividing these, although nothing is better than a slender knife, is the small bistouri caché, which I hold in my hand (fig. 27). All that is necessary is to introduce the end of the instrument into the canal, about an inch or more, according to the extent of the narrowing, then to project the blade and draw it outwards, dividing the obstruction. By means of a screw, the blade is made to project to a small or to a large extent. It should be used so as to make a rather free incision, which is perfectly safe. The condition in question is well seen in a preparation (see fig. 28). A strictured urethra when laid open for examination after death shows much less narrowing than might have been expected. The calibre of the narrowed portion appears larger than that which was known to exist during life; the division having to some extent liberated the constricting bands surrounding the canal. In the instance shown by the figure a No. 2 bougie was the largest which the canal would admit.

For all strictures which are more deeply situated I prefer another proceeding, and having disposed of those near the meatus, I shall devote this lecture to the consideration of those which belong to the former category, and which, indeed, form the great bulk of the cases with which we have to do; while they are certainly those which are also of the greatest importance.

The instruments employed are, as I have already said, numerous and varied. And there are two distinct methods of making the incision necessary in order to divide the stricture. This fact enables us to group all these instruments in two separate classes.

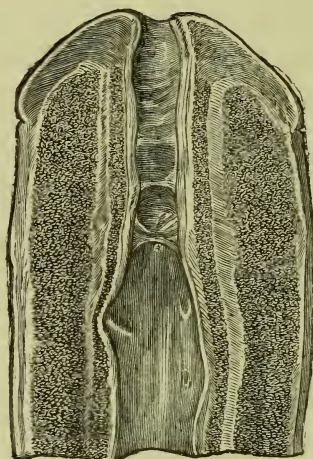


FIG. 28.—Strictures near to the orifice of the urethra.

I. The stricture may be cut from 'before backwards,' a blade being pushed through it on a guide previously passed.

II. Or a blade may be introduced through and beyond the stricture, and then be drawn outwards, dividing it from 'behind forwards,' in which case a guide is unnecessary.

I show you urethrotomes in great variety here, chiefly of French make, the operation having been practised in France before it came to be much employed here. Modifications innumerable of what were originally simple, perhaps we might say rude, instruments have been made during the present century in that country, and more recently elsewhere. Among

the earliest were those of Physick of Philadelphia (1795), Charles Bell (1807), Doerner and Dzondi in Germany (1818), McGhie in Scotland (1823), Amussat, Paris (1824), Stafford, London (1827). Then followed those of Leroy d'Etiolles, Civiale, Reybard, Ricord, Trélat, Charrière, Sédillot, Maisonneuve, Voilemier, and others, several of which are now before you; there is one also, a recent one, of Dr. Otis, which, like Reybard's, distends the passage at the same time that the incision is made.

I select two as types of the two different systems described of using a cutting instrument—the urethrotome of Maisonneuve and that of Civiale. I select the former instrument because it is not only a type of one which cuts from before backwards, but because it has been more largely and generally employed of late years, especially on the Continent, perhaps than any other; while with slight modifications it has also been used by some surgeons in this country. The instrument

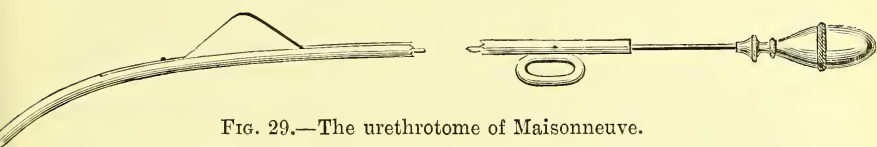


FIG. 29.—The urethrotome of Maisonneuve.

of Civiale I have selected because it is the typical one of the other system—viz. that of dividing the stricture from behind forwards.

The urethrotome of Maisonneuve consists of a slender guide or conductor in steel, the size and nearly the form of a No. 1 or 2 catheter, but grooved throughout its course. This is first introduced through the stricture into the bladder. Along this groove slides a blade of triangular form, the base of the triangle occupying the groove and being attached to a long steel wire stylet, while the two other sides form an angle which projects considerably. This blade can be pushed, by means of a handle attached to the wire, through the whole course of the urethra. (See fig. 29.) The upper side as well as the apex of the triangle are blunt, and the lower side of the triangle only is sharp and will cut. In the act of pushing down the blade, the healthy part of the urethra is protected from incision by the blunting of the apex (like the button of a

foil in fencing), while the sharp side divides certain of the hardened tissues which it encounters in its course.

The objection to this instrument is that the incision made by it is generally inefficient for a case of confirmed and indurated stricture, such, indeed, as constitutes that form of the disease which most requires treatment by division. It is an axiom accepted by most, if not by all, who have carefully observed the results of urethrotomy by any method, that if an incision of stricture is required at all, it is essential that the whole of the obstructing fibres should be divided. No one laid more stress on this doctrine than Syme of Edinburgh, after he had had a considerable experience of his method by external division. The cases of relapse following that operation he believed to be chiefly those in which he had cut insufficiently and left a few fibres undivided. And these occurred for the most part after his earlier cases, and before he had learned the necessity for free division. The justice of this observation was verified repeatedly by myself then, and also since in my own experience of internal urethrotomy. Now, what happens with Maisonneuve's instrument? The blunt apex, while it enables the blade to pass without injuring the healthy urethra, fails to cut the most elastic fibres of the stricture, since, by reason of their yielding character, they permit the blade to pass through by stretching them. The blade incises, no doubt, the strongly marked or narrowest portion of the stricture, but it is by no means certain that all the obstructing tissue is divided, especially certain portions which lie for some distance before and behind the maximum point of narrowing; fibres which, if uncut, will at no distant period of time show their presence and reproduce contraction. Further, by no manner of using the instrument can you control or regulate power. It is not a *tool*, which you can use with discrimination, but a *machine* capable of performing a certain result limited in extent, uniform in all circumstances, by one invariable method of action only.

Now, at this point, let us pause for a moment to consider a question of importance: namely, What is the principle on which an intra-urethral incision which is out of sight ought to be made, so that we may be guided in our choice of the best instrument to accomplish our purpose? Is the division

of tissue to be a complete one, and to be made solely according to the judgment of the operator ; or is it to be made by a machine, the action of which is not necessarily to divide all opposing tissue, but simply to incise enough to permit the introduction of a fair-sized catheter through the urethra when the cutting instrument is withdrawn ?

You have just seen how easily, when the director has been passed into the bladder, the latter result may be attained. No dilatation preliminary to the use of the cutting blade is necessary ; a single pressure of the hand completes the proceeding. But I think you will grant that the result is likely to be more perfect if the section can be accurately accomplished by means of a knife directed by the will of the surgeon, and manipulated according to the amount of resistance encountered at the time, and to the extent of obstruction found to be present. I suppose that a keen blade of appropriate form, and completely under the control of his hand, would be always employed by a surgeon, for use in any other part of the body than the urethra, when he desires to make an incision, the limits of which are to be carefully defined. For my own part, I can see no reason why that spot alone should be excepted from the action of this principle. Take the obstructing bands confining a hernial protrusion of bowel, for example ; here the finger and the blade act in perfect harmony ; the section depending entirely on the delicate perceptions of the former, which determine the surgeon's judgment during every moment of the cutting act. The section in tenotomy is perhaps a still more apposite illustration of the necessity that exists for an intelligently made division of every fibre which opposes the return of the limb to its natural position. In both instances section is made from the sense of touch only and without the aid of vision, and a like control should, I think, govern the act of dividing those bands which encompass the urethra and form the stricture. No mode of section is half so certain, so safe, and so satisfactory, as that of drawing through them, from within outwards, a little blade attached firmly to a long slender handle ; a proceeding completely under the control of the surgeon's hand. I know that this is not the generally accepted mode of operating either here or elsewhere. It is precisely for that reason—cherishing

as I do strong convictions as to the superiority of the method—that I have brought the subject rather fully before you to-day. I am told both here and abroad that the cutting blade sliding in a groove, of which Maisonneuve's instrument is the type, is so simple and safe a proceeding, that any man, however unpractised, may perform it. Is that a reason in its favour? The same doctrine was very lately taught in relation to the method discussed at our last meeting of splitting strictures, at one time so much in vogue; now so completely and so properly neglected, but always so easy of performance! Are we to accept an unsatisfactory proceeding because of its universal applicability, and thus be content to establish an imperfect standard for the sake of bringing it within the reach of incompetent operators? Between the two systems now under consideration there is this difference: one is the product of a machine, the other is the handicraft of an artist. And the same distinction which is so obvious in regard of innumerable forms of human activity, between the uniform and commonplace results of machinery and the finished achievements of the intelligent, painstaking artist, marks the character of the two modes of operating now in question. And let me remark that the practice of operative surgery becomes a sorry occupation, if it be not indeed an art, and a very fine art too. So far as it becomes a mere matter of mechanical contrivance, it ceases to be worthy the devotion of a man of parts. The instrument maker, with his purely mechanical knowledge, and ideas arising therefrom, often useful, has nevertheless always been a seductive and dangerous ally for the surgeon. Let us be grateful to him for valuable aid, accepting it with discrimination—and beware of him always! A cultivated hand is the most cunning and effective source of power, and the simpler the instrument employed, the greater is the influence of that hand, and of the intelligence which guides and permeates it.

The instrument which I hold in my hand, and to which I have been referring, is a modification of the urethrotome of Civiale, made shorter for me, with a different handle and a much smaller bulb than it is customary to make in Paris. In order to use it, the stricture must of course admit the bulb to pass through, and this is never less than No. 5 English. In

most cases a certain amount of dilatation is necessary; indeed, it is usually an essential part of the treatment to tie in for two or three days before operating a small flexible catheter in order to ensure sufficient dilatation to permit the bulbous end of the urethrotome to pass through and beyond the stricture for the purpose of dividing it. In the instrument now before you the shaft is about the size of No. 3, English scale, with an oblong bulb at the end not larger than No. 5. Within this

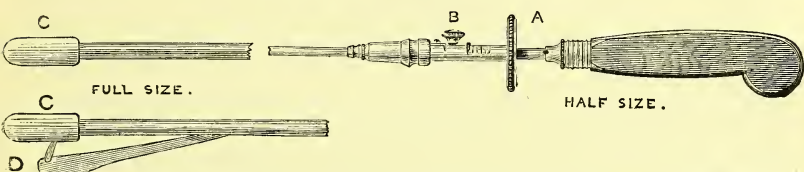


FIG. 30.—Author's first urethrotome modified from that of Civiale; the bulb is flattened laterally, the broad side being shown above.

is a little blade which, by a clever contrivance, the operator can make to issue at will, as much or as little as he desires, and which he can also sheath instantly at his pleasure. The bulbous end gives him the power of exploring the urethra at the time of the operation, and of determining precisely where and what he ought to divide (fig. 30).

I have recently designed another pattern, employing a urethrotome with a conical or sugar-loaf terminal (fig. 31), and in connection with it a set of exploring instruments of the same pattern.

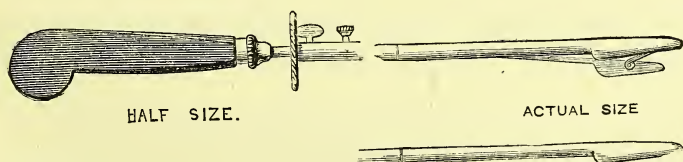


FIG. 31.—Author's second urethrotome. The terminal bulb of the urethrotome is conical in form, measuring No. 5 (English) at its base. The cone projects farther over the stem on one side than on the other, a form which enables the operator to appreciate the situation of the stricture better than if the stem were centrally placed.

The exploring instruments which are used previously to operating, in order to ascertain the precise situation, extent, and number of the strictures (if multiple) in the urethra, have terminals precisely like that of the urethrotome in form. The

length of the stem—that is, the distance between the handle and the base of the cone-shaped terminal—is six inches, and corresponds exactly with that of the stem of the urethrotome, and it is shown in inches on each instrument by graduation on the stem (see fig. 32).



Fig. 32.—The bulbous sounds, employed in various sizes, and made in precisely the same form.

This exact correspondence in length and form is very useful in practice, and whether we use an ovoid or a conical-ended urethrotome, a matter of very little consequence, a set of bulbous exploring sounds should be adopted which correspond, in the manner described, with the cutting instrument. A set complete, for all practical purposes, may consist of ten in number; to use the English scale, say, of Nos. 2, 3, 4, $5\frac{1}{2}$, 7, $8\frac{1}{2}$, 10, $11\frac{1}{2}$, 13, $14\frac{1}{2}$, and 16. Perhaps the best time to use them is while the patient is under the influence of ether, immediately after withdrawing the small inlying catheter, supposing one to have been employed, and before commencing to operate.

When you have become thoroughly acquainted with the narrowed points in the urethra, the bulb of the urethrotome is now to be carried, say, fully half or three-quarters of an inch beyond the remotest point of narrowing felt; the blade is then to be projected there, and drawn steadily through the whole of the constricted portion outwards towards the meatus, in which direction the incision is sure to be certain and complete.

Now I at once anticipate an objection which I expect you all to raise. I expect you instantly to exclaim, 'Why, if an instrument so large as No. 5 can be passed through the stricture, should there be any occasion to cut at all? Surely it is for small strictures, through which only the finest instruments can be passed, that an operation is necessary, and for such strictures this instrument is obviously unfitted by its size!' Such criticism is quite natural at the first glance, and from those who have not learned by considerable experience certain important facts about confirmed stricture.

I reply, first, that the *narrowness* of a stricture alone, however extreme, does by no means render a cutting operation *always* necessary. Some of the narrowest strictures I have seen have been very successfully and rapidly treated by simple dilatation; although this is admitted to be a rare occurrence.

Secondly, the quality which makes incision of a stricture necessary is, as I have previously shown, 'resiliency'—that property which leads it to contract again rapidly after any dilatation. This quality affects strictures which will admit No. 5, No. 6, or No. 7, quite as frequently as narrower contractions.

Thirdly, supposing it is necessary to cut a stricture which is narrow and only admits No. $\frac{1}{2}$ or No. 1, there is *never any difficulty in dilating it temporarily* up to No. 5 or 6 for the purpose of admitting the urethrotome which I recommend.

All you have to do is to keep the patient in his room from three to five days with a small soft gum catheter tied-in, which produces scarcely any inconvenience; and thus by 'continuous dilatation' you can always bring the narrowest and most resilient stricture, at all events, to the size necessary to admit the urethrotome. Having done so, you are able to perform the operation in the best possible circumstances. And the few quiet days spent in preparation are advantageous rather than otherwise; the result furthermore being that you can now make an incision in the manner I have described, directed by your intelligence and adapted to the particular case.

For safety to the patient and excellence in result, both in regard of his present and future condition, I greatly prefer the operation I have described to any other method I have ever seen.

I will now briefly detail the stages of the proceeding.

First: The situation of the stricture or strictures has, to some extent of course, been previously ascertained by the necessary examination—that is, their distance from the external meatus.

Secondly: It has been ensured, either by tying-in a catheter or otherwise, that at the time fixed for the operation the stricture is sufficiently patent to admit the bulb of the urethrotome to pass through it. The stricture should just admit about No. 5 (English scale). Having withdrawn the

inlying catheter, which in almost every case has been necessarily present for a few days, and re-examined if necessary the narrowed points of the canal, you will proceed at once to pass the bulb of the urethrotome gently and slowly along the urethra until the remotest stricture has been penetrated, a proceeding which usually requires a little gentle pressure and management; after which the little bulb is felt free and movable in the urethra on the farther side. In this situation, and at least half an inch beyond, or on the bladder side of the stricture, you make the blade project to the requisite extent by means of the simple mechanism in the handle which I show you, and directing the edge to the floor of the urethra, you press it firmly there, and draw it boldly outwards, as if you would make an incision, say an inch and a half or two inches in length, so as to divide all the thickened tissues which constitute the stricture. You feel them sometimes offering much resistance. Take my word for it, you need not fear freedom of incision. I never saw any serious harm produced by it, although I have seen less success resulting than I desired where I have not sufficiently divided the stricture, as may have been the case in some of my earlier experiences, and have so left a fibre or two uncut. But I have never had occasion to regret a free and complete division. The other points of narrowing are to be recognised after the first has been divided, as you pass outwards, and in a similar manner; and then the meatus, often necessary, unless this has been done at the outset.

Next, you introduce a No. 14 or 15 (English) plated sound, slightly conical, which should go quite easily into the bladder, and not be in the least degree 'held' in withdrawing it: keep along the upper portion of the canal, and the point of the instrument will not get into the incision. If it is 'grasped' or 'held,' a portion of the stricture remains undivided, and should be at once cut; the same urethrotome, or another with a larger bulb, being introduced for the purpose. After which the No. 15 or even 16 should pass with perfect facility. Or, if any other point of narrowing be discovered, after the principal one has been cut, it also should be divided. The operator should be provided with a series of the bulbous exploring instruments described, ranging up to No. 16, so as

to be quite certain of the whole canal from the meatus downwards. All being completed, you should take a No. 12 well-curved gum catheter, and pass it into the bladder, tying it there in order to retain it forty-eight or, if you have cut freely, seventy-two hours. It is best to introduce it well-curved, or upon a stylet, in order to avoid the wound, which otherwise the point of the instrument might enter, occasioning you some embarrassment. Of course the stylet, if used, is withdrawn immediately afterwards.

Now, as to results: in the operations I have done, approaching four hundred in number, I have rarely seen any bleeding which could be regarded as considerable—sometimes only a few drops appear; once, and once only, it was severe, and occasioned me much anxiety, but it ceased ultimately, and the patient recovered. On two occasions some extravasation of urine occurred when the catheter became displaced—an ample reason for always employing one—and twice abscess has followed; but you yourselves can also form a judgment, to some extent, of these questions, since you must have seen at least twenty cases of this operation in the wards during the last twelve months. Sometimes there may be a considerable amount of fever, but very seldom, and, still more rarely, cystitis; much depends, I need not say, on the care and completeness with which the various steps of the proceeding are conducted. The incisions must be cleanly and effectively made through the obstructing tissues; and not in a false passage leaving the stricture untouched, a mischance which has sometimes occurred to an inexperienced operator. Then the inlying catheter must be well placed, and sedulously watched, so that the channel is not blocked by a clot of blood or a plug of mucus, and retention or hazardous forcing out of urine by its side, and perhaps into the wound, take place.

On three occasions only has the operation been followed by fatal results. The first death occurred in the case of a man in one of my wards here, for whom I performed the operation as a last resource, and the autopsy showed such an advanced stage of disorganisation in the ureters and kidneys, that I am not surprised at the result. The second case, in private, was a very remarkable one, in which death took place

from embolism of the heart and great vessels within ten days after the operation, no very obvious sign of local disturbance elsewhere having manifested itself. The third was a case of septic poisoning, of a slow and lingering type. Indeed, if anything has surprised me, it is the extreme safety of the operation, for my earliest belief about it was that it was by no means free from risk, and I hesitated to employ it except in very urgent cases. Now, with my present experience, I never hesitate on the score of danger, for there is almost absolutely none; of course I speak only of that kind of urethrotomy which I employ, and have described in this and alluded to in the preceding lecture.

It is not an uncommon, although it is an exceptional occurrence, to find the patient attacked by a rigor and fever when the inlying catheter has been withdrawn after the operation. The first act of passing water naturally afterwards seems to expose the patient in some way to this accident. One might suppose that a drop or so of urine has entered into a remaining portion of unclosed wound, that absorption takes place, and the systemic disturbance announced by rigor is the result: who shall say whether this is so or not? I am disposed to think it is not improbable. In any case, biassed by this theory, I adopt, with a view of avoiding the occurrence, the following plan: When the time arrives, forty-eight or seventy-two hours, as the case may be, for withdrawing the catheter, all the urine is first removed; a hot hip bath, 100° to 104° , is given, a great comfort after the confinement and inlying catheter; and the patient returns to bed to be well covered up, with instructions not to pass water until he feels a manifest desire. This will probably not occur until six hours after the instrument was withdrawn. He then stands up, makes a full stream, is generally very much astonished at its volume and the ease with which it flows, and goes back to bed as before for the day. Following these precautions, you may hope he will escape the rigor; but if not, you know, at all events, that there is no risk, and no ground for anxiety. Sometimes, but this is extremely exceptional, the fever is somewhat more severe and prolonged.

The subsequent treatment may be briefly sketched. On the fourth or fifth day after the operation, pass a conical

French bougie with a large bulb, so as not to open any portion of the incision still possibly not closed. If it does not pass easily and encounters obstruction, withdraw, and pass a well-curved metal instrument, which is but slightly conical; the former, however, usually suffices. Repeat the proceeding in three or four days, with either flexible bougies or metallic dilators, when No. 13, 14 or 15 ought to pass with considerable ease. After this, pass the instruments once a week, and the patient, having been meantime taught to use them, will do this for himself at increasing intervals, ultimately arriving at, say, once a month.

This operation gives, I believe, more lasting results than any other. You have seen me perform it for cases which have experienced every other known treatment, and in which the stricture had returned as badly as ever. For most of these I think it is the best mode of proceeding at present known. I do not claim for it the power to remove organic contraction. Such a result is impossible. The treatment has yet to be devised which can be relied upon to remove absolutely, and for ever, the occurrence of recontraction in a patient who has once become the victim of an organic stricture. Thus, in some instances I have repeated this operation for the same patient when eight or ten years have elapsed, and with the best result: and I have had some cases in which I have done it a third time, after a second long interval. I should not hesitate to repeat it as often as might be necessary to remove the serious troubles which an obstinately narrowing passage reproduces.

Briefly let me, at the close of this subject, remind you that, in view of any operation, and indeed in all cases of impeded micturition, attention to the general health often aids in a considerable degree to mitigate the local troubles. Do not overlook the state of the digestion. If this is unsatisfactory, if the bowels are unduly constipated, the troubles of the bladder and urethra will be much increased; and frequently it happens that a mild mercurial, followed by a dose of Glauber's salts, or of some natural aperient water, in the morning, gently acts on the digestive organs and bowels, and greatly relieves the most distressing symptoms. Then take care to guide your patient in relation to diet, and more

especially let his alcoholic drinks, if any are admissible, be taken in moderate quantity, and be of the mildest kind.

There is only one other word to say. I do not seek to make you partisans of any single mode of practice. You may hear one surgeon say, 'I always follow such and such a method: there is nothing to equal it;' or another, that he always adopts the proceeding of Ricord; and a third that of Maisonneuve, and so on. There has been great activity among inventors of instruments of all kinds, especially in Paris, and you may see from several of them very excellent results. Do not necessarily limit your selection to any method which I or any other may recommend. If you have much to do with stricture, and with allied complaints, be assured you will want all the resources within your reach. Consider them carefully, and select for each individual case that method which appears in your judgment to be best adapted for it.

And my last words are, above all things, be patient, unsparing of time, use a light and cautious hand; and then, whatever instrument or method you employ—provided you have experience and therefore some confidence in using it—it will probably be the best not only for you, but the most efficient for your patient.

LECTURE IX.

THE ENLARGED PROSTATE OF ELDERLY MEN, COMMONLY
CALLED HYPERTROPHY, AND ITS CONSEQUENCES.

GENTLEMEN,—We shall pass from the subject of stricture to another very important form of obstruction to the urinary outlet, and one of common occurrence, generally known as ‘Hypertrophy of the Prostate.’ The condition thus described affects a large number of elderly men, and thus the medical man in general practice is almost certain to meet with it pretty frequently. Hence the necessity for your carefully studying these cases when met with here, as they are certainly more frequent among the upper and middle classes than among mechanics and labourers. Thus, not many are to be found in the hospital beds, and only a few are treated as out-patients.

But before proceeding to consider this condition, I shall ask your attention to an important generalisation respecting the various forms of obstructed micturition, regarded as a sign or symptom of disease.

First: obstructed micturition in an otherwise healthy young man, say from eighteen to twenty-five years of age, is more likely to be due to some form of urethritis which has led to inflammation of the prostate, and perhaps the bladder, than to any other cause.

Obstructed micturition in a middle-aged man, say from twenty-five to fifty-five, may be due to the same cause, but is more likely to be due to stricture of the urethra.

Obstructed micturition in an elderly man, say at and after fifty-six years, is often due to senile enlargement of the prostate, and consequent inability to empty the bladder by his own efforts.

You will very rarely find much impediment to micturition produced by stricture before twenty-five years; you will never

find it due to senile enlargement of the prostate before fifty-five years.

Now, I wish to guard you against confounding this last-named condition of the prostate with enlargement of the organ from any other cause. And I may remark that the increase in bulk which takes place is not a hypertrophy in the sense in which that term is employed to designate a heart which enlarges from thickening of its muscular walls to overcome obstruction, or the increase of size in the muscles of the arm when habitually occupied with unusually severe labour. This enlargement is indeed *sui generis*: no other organ of the body is similarly affected. It has no relation to, or affinity with, inflammatory deposits, such as we may observe in the swollen tonsil, or in lymphatic glands. It is not due to the presence of cancer or epithelioma, and is, in fact, not a 'morbid' growth at all, although diseased conditions of the bladder occur as the result of the mechanical obstruction occasioned by its presence. It is on the contrary a fresh growth of the natural elements, either of simple fibrous tissue (stromal), or of simple gland tissue, or of the two associated; conditions which may pervade the entire organ, or affect only isolated portions. Nothing resembles it, except perhaps the so-called fibroid tumours of the uterus, which consist mainly of an augmented production of the constituent elements of that organ. I make these remarks because I so often observe confusion of ideas respecting this complaint. Many people fail to distinguish it from another common form of enlargement, with which, however, it has no relation whatever. I mean that which results from inflammatory deposit. For the latter is essentially a phenomenon liable to occur in the first half of human life, while, as I have already said, the former belongs solely to the latter third. Hence I think it is better to avoid the term 'hypertrophy,' and to substitute that of 'senile enlargement' for it in future.

It was formerly stated by Sir Benjamin Brodie, that 'when the hair becomes grey and scanty . . . the prostate gland usually, I might perhaps say invariably, becomes increased in size.' It is greatly due I believe to this unqualified opinion, carrying, as it undoubtedly does, the weight of high authority, that the advent of this condition has been very generally

regarded throughout the profession as a part of the natural and regular consequences of advancing age. Such was certainly the common belief when I first began to make some special researches in reference to this matter, now some thirty years ago. I was then at the pains to examine after death all the bodies of male patients over fifty-five years of age who died in the Marylebone Infirmary; and afterwards, in Greenwich Hospital, the inquiry was pursued by Dr. Messer and myself. I took care to dissect each prostate very carefully, and I discovered that, so far from the presence of prostatic enlargement being the rule, this condition was quite exceptional. I examined about two hundred cases—not picked cases, but all who died consecutively within a certain period—and I found that about one in three exhibited after death some enlargement of the prostate, that is, including all the very slightest manifestations of increased size. But do not suppose that anything like a large proportion of those manifested any signs of this condition during life; for only about one in seven had any symptoms of obstruction to the flow of urine, and many of these were inconsiderable. So that you see it is not more than one in (let me say) fifteen or twenty men who live beyond fifty-five years of age who can be expected to require some treatment for this affection. The number thus estimated is, no doubt, considerable. If you suppose that one man in every twenty who are approaching sixty years of age has some symptoms of enlarged prostate, you will see at once how often, if you have anything like a large practice, you may be called upon to advise in these cases.

We will now consider one or two anatomical points connected with enlarged prostate. The healthy organ is, as you know, composed of two lobes and a median portion. Now, the part affected with enlargement very much influences the results in relation to the function of micturition. It is by no means necessary that the natural size of any portion should be much exceeded in order to produce severe symptoms. On the other hand, you may have a very large prostate, and may have almost no symptoms. Almost the largest I ever saw, as big as a small cocoa-nut, produced very little obstruction to the flow of the urine. And yet it is also the fact that the largest prostate I have ever seen produced absolute retention

for about five years before the age of sixty-three, when the patient died of the complaint. To return, however, to my first remark, I may point out that if the median portion of the prostate alone is slightly enlarged, there may be complete retention. Let this diagram (fig. 33) represent the two lobes and the median portion. If there is a small nipple-like projection at the median portion just filling the internal orifice of the urethra, the obstruction so occasioned may be quite sufficient to prevent every drop of urine passing by the natural efforts. Sometimes a considerable eminence arises here, shown in the diagram, fig. 34. Sometimes there is a

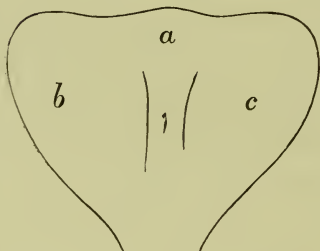


FIG. 33.—Diagram of healthy prostate.
a, median portion; *b* and *c*, right and left lobes.



FIG. 34.—Diagram representing a tumour filling neck of the bladder.
b, *c*, the line which the catheter may take on either side of it.

considerable enlargement chiefly affecting one side, so that the passage is circuitous; and you will sometimes find the catheter carried to the right or left, according as the prostate may be large on one side or the other. I show you several examples: two are depicted at figs. 35 and 36. You will therefore remember that if on examining a patient you find a very large prostate, it does not necessarily follow that he should have great difficulty in passing his water; and, on the other hand, although you may be unable to discover enlargement by rectal examination or otherwise, you may not therefore conclude

that all his troubles—and they may be considerable—are not entirely due to this complaint.

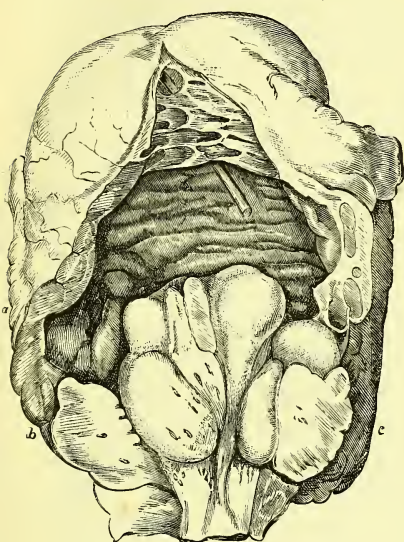


FIG. 35.—Section of bladder and prostate ; the former hypertrophied, the latter forming prominent tumours within the bladder.

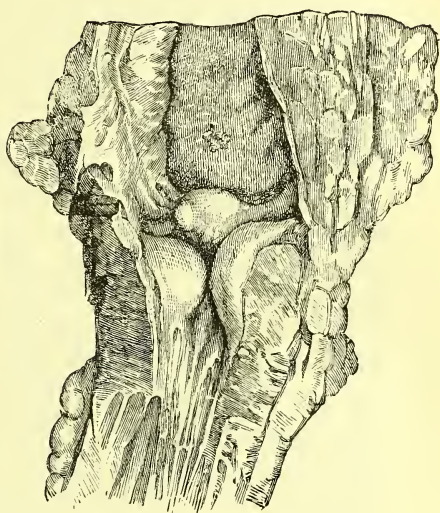


FIG. 36.—Section of bladder and prostate, showing marked but not great enlargement of lateral lobes and median portion.

I will now say a word as to the age at which this affection appears. I never saw a case of true senile enlargement of the prostate, not enlargement from inflammation and other causes, before the age of fifty-four ; and if I have not seen such a case, you may conclude that it never or very rarely occurs. The usual time at which it begins to show itself is from fifty-five to sixty. If a man has it at all, he will generally manifest some signs of it by sixty. If he is free from enlargement when over sixty-five or seventy, he may still be the subject of it, but in a less degree ; severe symptoms rarely commence so late. I have examined the bodies of men at ninety, without the slightest enlargement. You see, then, that it is by no means necessarily connected with advanced age. The man who escapes it at sixty-five will be not unlikely to escape it altogether, or nearly so.

I speak next of the symptoms. An elderly man comes to you and complains that of late his water has not passed so

freely as heretofore ; that it has issued in a small and feeble stream, and that he cannot propel it more quickly by his efforts to do so ; that he requires to micturate a little more frequently, especially in the early morning before rising, and also probably two or three times while he is dressing ; that after breakfast he is less troubled, but that during the night it is decidedly more frequent than during the day. Then if after this he has very little to say relative to pain, or of bleeding, &c., which would naturally arouse a suspicion of calculus or some disease of the bladder itself, you will probably infer that the case has very much the aspect of prostatic enlargement. Still you are not necessarily to proceed at once to pass a catheter ; I would rather that you investigated the condition further by proposing the usual cardinal questions, after my plan, and more than once referred to. Thus you will ask first how frequently he passes water—in this instance you have already been informed, and have learned also that the frequency is greater by night than during the day. Now this is an almost invariable rule with patients affected by hypertrophied prostate, while the reverse takes place with those who are the subjects of stone in the bladder. I cannot tell you why, but it very often happens that patients with hypertrophied prostate pass as large a quantity of urine during the eight hours of night as during the sixteen hours of day ; hence the disturbed rest and sleep of which they complain. Then you will also further inquire whether the water ever passes without the patient's knowledge, or without his willing it. In many advanced cases you will find that some urine passes during a violent effort, such as coughing, or when he is unconscious at night, during sleep. If so, the case is probably one of rather long standing, with a good deal of distension of the bladder, and urine retained therein.

You will next make inquiries about pain ; and particularly whether it is felt before, during, or after the act of passing water ; what is the situation, and what the nature of it. If pain be felt before micturition and diminishes as the act proceeds, an enlarged prostate occasioning undue distension of the bladder is very probably the source, and as the distension diminishes the patient's suffering is relieved. If, on the other hand, there is little or no pain until the urine ceases to

flow, and then a severe twinge is felt in the anterior part of the urethra, especially in the glans, the possibility of calculus as a cause must occur to you.

Then you inquire about the character of the urine, whether it is clear or cloudy. In most instances at an early stage it is clear. In a great number of cases of prostatic enlargement, although the bladder has not been emptied for months or years the water is still clear. On the other hand, if the case is one of long standing, the water will usually be cloudy. And making this inquiry will lead you to ask about the characters of the stream itself. Usually it flows in a feeble, irregular manner, rather falling directly downwards than flowing in a current, and thus differing from the stream in cases of stricture. In stricture the stream is often propelled exceedingly well, although it is no larger than a thread; and so long as there is a stream, the patient can act upon it by the will, so as to make it stronger; whereas, strain as he may, in prostatic enlargement he often cannot influence the stream, except, indeed, for the worse. It may happen, from the median portion of the prostate being forced by straining into the passage, that the more the patient strains the less freely can he void his urine. Generally speaking, the muscles constituting the walls of the bladder are considerably involved in the overgrown tissues of the prostate, and are thus prevented from acting effectively, so that their efforts to act are useless, and the stream cannot be propelled with any force. Then, also, it happens in the course of time that the coats of the bladder become more or less over-distended, thinned by expansion, and so powerless to act; the ureters participate in the same action, and, together with the pelvis of the kidney, dilate, and even, in very advanced cases, retain urine, as well as transmit it.

It is desirable always to see for yourself what the character of the patient's stream is, if possible; observe the position he takes in passing it, whether he bends forward, or stoops so as to bring abdominal weight and pressure to bear on the distended bladder; also the force expended, and the result of it. In this way you may be materially aided in forming an opinion.

Then you ask the last question: 'Do you pass blood?'

Usually, in the early stages, the reply will be in the negative, although a little may appear after much exercise, so far suggesting the presence of stone; for slight hæmorrhage is by no means a frequent occurrence in simple senile enlargement, unless produced by instruments, which, it is understood, have not yet been used for the patient under consideration.

But, in order to complete a diagnosis of the case, a mechanical examination of the region is essential. The first step consists in introducing a flexible catheter of rather small size, and by choice one of the kind termed 'coudée,' hereafter to be described. Before employing it you are invariably to make the patient pass water, because your object is not so much to ascertain whether enlarged prostate exists, as to ascertain how far the organ is a barrier to the exit of urine from the bladder. The important fact, equally for the patient and for yourself, is not the exact size, condition, or shape of the prostate, but to what extent it has become an obstacle to the exit of urine. And it is a knowledge of the quantity of urine which you thus discover to be left behind in the bladder after he has passed all he possibly could by his natural efforts, which reveals his condition and will determine the future treatment. But in these circumstances the patient often makes a strong protest against the resort to a catheter, erroneously thinking that the frequency of his calls to pass water indicates that he is already passing too much urine, and not the use of the catheter to withdraw still more!

Now, with regard to the employment of the instrument for patients with the symptoms described, whatever they may think, you are not to forget that undue frequency of passing water, and still more the passing of it involuntarily, indicate an urgent necessity for making an examination by means of the catheter.

Nevertheless, in relation to frequent micturition, it is not uncommon for the practitioner himself to be misled by a fact often associated with it—viz tha^t he daily quantity of urine passed is quite equal, if not more than equal, to the healthy average. I have often heard this assigned as a sufficient reason for not using a catheter in these cases. For it is urged, with a certain show of plausibility, that 'a sufficient

quantity being passed every day, how can there be habitually retained urine in the bladder?' A moment's thought will prove that the question of habitual inability to empty the bladder is not in the slightest degree affected by an observation of the *quantity* of urine passed, this indicating solely the activity or the reverse of the excretory function—that is, the action of the kidneys. The reservoir—in other words, the bladder—may be always half-filled, or even more, with urine, whenever the act of micturition ceases; but it none the less serves to receive and to transmit the daily two or three pints, or any larger quantity. The reservoir is diminished in capacity exactly by so much as equals the space occupied by the constantly retained urine, and frequent micturition is the necessary consequence; a result which is inevitable. In short, the amplitude of the quantity passed daily is not to be regarded as affording the slightest evidence in relation to the inquiry, 'Is the bladder emptied or not by its own natural efforts?'

Secondly, in relation to involuntary micturition, so often miscalled 'incontinence,' it is really remarkable how common are the errors, not merely of patients, but of practitioners, on this point. They are apt to be misled by the fact that the patient insists, 'I do not make too little water; I am making water too frequently, and too much of it, and even against my will, and therefore my bladder must be empty. Tell me how to retain my water, and I shall be much obliged to you. Don't think of drawing it off.' It is surprising how such language sometimes influences the practitioner. Nevertheless, these are the very circumstances in which you should never fail to pass the catheter and ascertain the real condition of the organ.

Always bear this in mind (and I wish, figuratively speaking, to render that sentence in the largest capitals), that INVOLUNTARY MICTURITION INDICATES RETENTION OF URINE, AND NOT INCONTINENCE.

There are a few exceptions to the rule, but very few. Most of the mistakes that are made on this point arise from the use—or, as I shall show you, the abuse—of the word 'incontinence,' which means, of course, that the bladder is empty; and certainly, when the bladder cannot retain the urine, its

condition is rightly described by the word incontinence. But this condition occurs only in very uncommon, although generally well-defined circumstances, such as in some cases of cerebral or cerebro-spinal paralysis, and in rare injuries to the neck of the bladder; and in these the urine runs off as fast as it comes from the ureters, the bladder having ceased to act as a reservoir.

You will observe then that this constant outflow is an obvious sign, not only in the last-named cases, but also in those in which the bladder is over-distended with urine—that is, in both the urine flows involuntarily. But mark how totally different are the two conditions in question: in one the bladder is full, in the other the bladder is empty. Whenever, then, you meet with this involuntary flow of urine so often miscalled ‘incontinence,’ do not conclude at once that there is ample exit for the urine. Rely upon it the bladder is full, and that the only way of relieving the patient is by the use of the catheter. I lay great stress upon this, because I have seen lives sacrificed by a forgetfulness of this point. I have made post-mortem examinations of persons who have died solely from the effects of undiscovered retention, the existence of this fatal condition not having been suspected during life, because the urine constantly passed off, as it was supposed, ‘so freely.’

Now, we know that our views of things and our consequent acts are very much determined by the manner in which we use and apply words respecting them, and it is impossible to be too clear and defined in all our language, especially in that which relates to pathological conditions and surgical practice. I cannot express to you how strong my sense is of the importance of lucid and accurate statements; hence I have felt it my duty frequently to point out the common misuse of terms in connection with this subject.

First, then, the term incontinence, which means the bladder is empty, or ‘cannot contain,’ should never be employed by you to denote the phenomenon that the patient’s urine flows involuntarily; for, as we have seen, in that condition the bladder is generally full. It is better to use a term which denotes only the actual fact observed, namely, ‘involuntary micturition,’ without reference to the cause, and when

this is found to be over-distended bladder, to describe the condition as 'overflow.' Then, remembering always my maxim, that 'involuntary micturition indicates mostly retention, not incontinence,' you will never make the fatal blunder I have spoken of, and which I assert to be so common. This, too, assimilates our usage very nearly to that of French surgeons. The French have hitherto, with careful choice of terms, described such a bladder as 'engorged' and 'overflowing,' but never as 'incontinent,' except to denote that rare condition in which the bladder is always perfectly empty. I have, therefore, long been in the habit of denoting a bladder which is full, but allows surplus urine to run off little by little against the will of the patient, as an 'engorged' bladder, and the phenomenon thus described as 'overflow'; and I hope you will do so too.

This brings us, by the way, to another common instance of the misapplication of terms. In this country, the condition of the organ just alluded to is often called 'paralysis' of the bladder, and the unfortunate word leads to mistakes in practice. The bladder is rarely paralysed. I know nothing of it except as an effect of spinal or cerebral changes. The bladder is never by itself the subject of paralysis, meaning, of course, an affection of the nerves, either central or peripheral. It may be unable to expel its contents, because there is mechanical obstruction, as enlarged prostate, stricture, or impacted stone, or because the muscles have lost their power of contracting from long over-distension, a condition more properly to be spoken of as 'atony.' But in none of these cases is the inability due to impaired nervous supply, and consequently the use of the term 'paralysis' is unwarranted and misleading. The condition to which that term is rightly applied will be considered at a subsequent lecture.

After this digression, which its importance must excuse, we shall now consider the physical diagnosis of senile enlargement of the prostate.

Immediately before commencing, the patient is to pass urine to the extent of his ability. Let him do it by himself, privately if you wish it efficiently done: in a stranger's presence he will probably perform the act imperfectly, and your test may be inadequate and so mislead you. And when he

has really passed all he can by his own efforts, introduce a flexible catheter ; if an English gum, let it be well curved, and about 7 or 8 in size. Better still is the French coudée catheter already referred to, say about No. 13 or 14 of that scale. (See fig. 37.)

In using the last-named instrument, let it be passed in a downward direction (the patient being upright) for the first half of its course, gradually descending to below the horizontal line as it is about to enter the bladder. If you use an English gum catheter, remove the stylet, and keep the shaft, in passing it, well back in the groin, so as to maintain the curve. In either case, as soon as the instrument has entered the bladder its condition will be ascertained ; it may possibly be empty, but more probably some will issue, and you will carefully ascertain the quantity by measure. It varies greatly in different cases, from an ounce up to several pints. I have

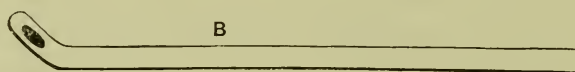


FIG. 37.—The coudée catheter.

drawn off six pints, the patient not in the least suspecting he did not empty his bladder, but that is an unusually large amount. You may find commonly from three or four to twenty ounces. To this urine, which you have removed by instrument, and which the patient could not pass by his own efforts, I apply the term ‘residual urine,’ and shall thus speak of it hereafter.

Next, the patient lying on his back, you may place your finger in the rectum, and examine the size of the prostate, for any deviation from its natural form and size ; and if the latter is augmented, whether the enlargement is more on the right or the left side. Of course you do this as gently as you can. The finger should be covered with grease and very slowly introduced ; or you may produce considerable and unnecessary pain. Make pressure on the prostate at different points, noting if it is uniform in consistency, or more tender in one spot than in another. The position described is preferable to any other, because you can make pressure with the

unemployed hand above the pubes, and so bring the bladder and prostate near the finger in the rectum, a material assistance sometimes in your endeavour to ascertain their condition. Such are the inquiries which it is desirable to pursue, and beyond these it is not usual or desirable, at any rate at the outset, to carry your investigation.

LECTURE X.

TREATMENT OF SENILE ENLARGEMENT OF THE PROSTATE.

GENTLEMEN,—The question of treatment comes before us to-day. Let us then first define what is the scope or design of the therapeutical scheme to be adopted for an elderly patient with enlarged prostate. First, we have to inquire what treatment may be found available against the progress of the enlargement itself, either by medicine, or by mechanical appliance; secondly, what is the treatment of the various consequences, some of them very serious, which result from obstruction to the outflow of urine so produced; and lastly, there is the general treatment by regimen, diet, &c., which such patients should pursue.

Now, what is to be advised in respect of the first consideration, that which aims at checking or diminishing the growth of commencing enlargement of the prostate? I fear I must reply that, as far as medicine is concerned, there is no remedy in or out of the Pharmacopœia on which the slightest reliance can be placed to influence that enlargement in the smallest degree. It is useless to disguise, either for ourselves or for the patient, that important fact. There may be temporary enlargement of the prostate from congestion or inflammation, and that may be diminished by appropriate treatment. But senile enlargement (hitherto usually termed hypertrophy) cannot be diminished by any known means. It is almost needless to say that numerous agents have been employed, both as internal medicines and local applications; and for each of these purposes, as might be supposed, preparations of iodine and of mercury have been particularly vaunted. And, notwithstanding all that has been claimed for these agents in certain quarters, I assure you with regret, but with the most complete confidence, that neither iodine nor mercury does

anything but mischief, however employed. In addition to these, other remedies, as hemlock, hydrochlorate of ammonia, liquor potassæ, besides some less known agents, have been tried in their turn, and all have similarly failed.

Then, again, the effect of pressure has in former times been regarded as of some value. It has been applied in various ways; perhaps in no form better than by water-pressure through the agency of a syringe, exerting expansive force, within an india-rubber tube previously placed in the prostatic urethra, a method tested by myself some thirty years ago, but ultimately laid aside as producing irritation without any sensible improvement. I just allude to this fact, as I regret to observe that a recent attempt to revive the practice has been made; especially as there is not the slightest foundation for hoping to attain any advantage, at all events for the patient, by that process.

On the other hand, it is in our power to render the subject of senile enlargement most valuable service: so much may be done to palliate the distressing results of his malady. Most of these arise from mechanical obstruction to the outflow of urine, and the remedy therefore consists chiefly in the use of mechanical appliances. The first object of treatment is to relieve the partial retention of urine by the catheter. The habitual quantity of this retained urine is to be ascertained by passing the catheter on two or three different occasions, immediately after the patient has passed as much as he can by the natural efforts. The quantity thus drawn off is to be regarded as the measure of his deficient power. And the urine so removed is termed 'the residual urine,' and its habitual amount is to be watched, and generally registered for that purpose.

There appear to be two causes which give rise to this incompetency on the part of the organ to empty itself, and these I shall ask you now to consider. The first is, as you know, the obstruction of the enlarged prostate itself at the neck of the bladder. But there is, moreover, an inability of the muscular coats of the bladder to contract and expel its contents, and one way in which this acts may be thus explained. When obstruction is first encountered, the muscular fibres of the bladder become developed in order to overcome the diffi-

culty, just as the walls of the heart thicken when obstruction exists in one of its main outlets. Then the circular fibres at the neck of the bladder are rendered incompetent to act by reason of the enlarged prostate itself, in which they are more or less structurally implicated. The thickened bladder is less distensible than the bladder of normal character, and the organ is often equally disqualified for retaining much urine or for expelling it entirely; the cavity of the bladder being diminished, in part by the protrusion of enlarged prostate into the interior, and in part by the rigidity of the coats, as above explained. But a more common occurrence, especially when resort to the catheter is first made in an advanced stage of the complaint, is that, owing to a large amount of residual urine, the coats of the bladder are distended and have become incapable of acting; hypertrophy has disappeared, and thinning of the coats and atony necessarily follow, so that the bladder becomes a flaccid bag incapable of expelling its contents. It is in such cases that the habitual use of the catheter is necessary. Often, as long as the patient lives, he will withdraw more or less of the urine, sometimes all of it, by the catheter. And such a patient may continue to do this for many years, and at the same time remain actively engaged in the business of life. And it is by no means certain, if he is well taken care of, that his days are much, if at all, shortened as a consequence. One thing is essential, as in all instances where a daily catheterism is necessary—namely, that the instrument employed, and the mode of using it, should be those which produce the least possible trouble and irritation. The more frequently it is necessary to introduce the catheter, the more essential is it that the easiest manner of doing so should be ascertained and followed.

In almost all cases—although an occasional exception appears in which a silver instrument is preferable—a flexible catheter is to be preferred. And that which I advise you try first in all cases is a soft and pliable coudée catheter (see fig. 37, p. 118). Its turned-up point passes over whatever eminence is present at the neck of the bladder more readily than any other instrument. Nevertheless there are not a few instances in which the vulcanised indiarubber catheter will traverse the urethra more easily than any other. It has the

advantage of being very portable, and may be coiled in any form, treatment which spoils any other instrument. But this extreme flexibility renders it useless if the urethra is narrowed either by stricture, or by much pressure from the two lateral prostatic lobes bulging into the canal. A very little 'friction' impedes the progress of such a catheter. There must be always some, and this is reduced to a minimum by using one No. 6, or at most 7 in size, with a highly polished surface; never use those which have surfaces without gloss, and are large in size. Remember, moreover, that the vulcanised catheter naturally increases in size by use. Teach the patient, when passing it, to push in not more than three-quarters of an inch at a time, with a quick movement, and not by slow pressure. When five or six inches have been introduced, the

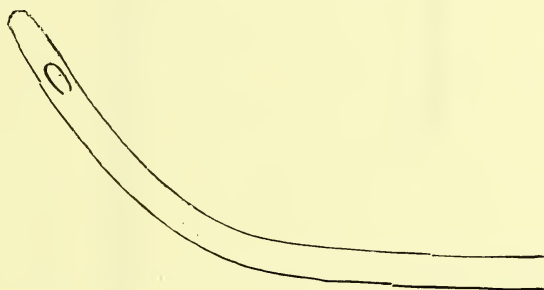


FIG. 38.—Example of badly-curved catheter for enlarged prostate.

instrument should be held in place for about five seconds after each push, so that the pressure may be transmitted to the end of the instrument, without which it will spring out again, and no progress will be made. In some cases the English gum catheter compares with it advantageously when well curved and properly managed; but some preparation of the instrument is necessary to elicit its best qualities. The instrument maker generally curves the catheter pretty much in this way (see fig. 38); the point straight and not well curved—the worst form which can be given to a catheter for effective use. In order to pass easily over prostatic enlargement, a catheter ought to be well curved *to its very point*. I will describe the best plan for treating the English gum-elastic instrument so as to prepare it for successful action when it is wanted. Let me first say, however, that it is assumed you

desire to employ a flexible instrument, for if you require or prefer one that is inflexible, a silver catheter should as a rule be selected, not a gum-elastic one with a stylet in it, although in some exceptional conditions this may be useful. To return, let the English gum catheter be mounted on a strong iron stylet, greatly over-curved (see fig. 39), for a month or so before it is wanted, and then of course it is to be used without the stylet. For your object is to carry the instrument easily and safely over an obstruction formed by the enlarged prostate; and as the heat of the urethra always relaxes the

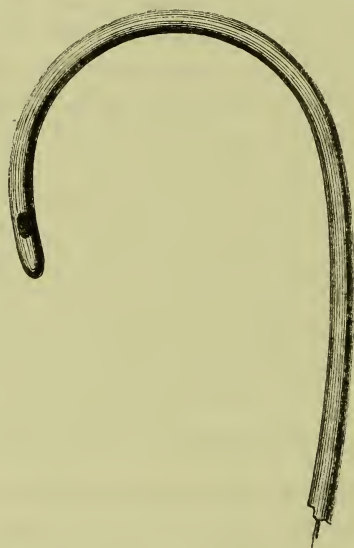


FIG. 39.—A catheter mounted for use on an overcurved stylet.

curve of a flexible instrument, in its progress towards the neck of the bladder, the ordinary gum catheter becomes nearly straight when it arrives there, and will not pass over the enlargement. But, when you have a catheter which has been well overcurved in the manner described, wait until the moment before using it to remove the stylet, and turn back the shaft so as to convert the extreme curve into an ordinary one. And what happens when you pass it? In spite of the heat of the urethra, the prepared catheter has a tendency to curve more, instead of less, as it passes down the passage, and doing so, easily surmounts the obstacle. And this

tendency often makes precisely the difference between success and non-success. That little manœuvre I regard as of extreme value. It is very simple, but I repeat it: keep the catheter overcurved—not for stricture, but for enlarged prostate; then, having removed the stylet, turn back the shaft immediately before using it; the curve gradually increases as it goes onwards, and it passes over the enlargement into the bladder. This treatment of the instrument may seem scarcely worth so much attention; but I can assure you that I know few practical hints that exceed it in value.

But the English gum-elastic catheter may be rendered very effective by another mode of using it. It possesses a quality, just referred to, which is found in no other. If put for a minute or two into hot water it becomes quite soft, and may then be bent into any required form, adapted, it may be, for the necessities of some particular case; and this form becomes nearly permanent if the instrument is plunged into cold water, care being taken while doing so to preserve the desired form. But the best form so produced may easily be spoiled by your mode of using it. Of course the curve must not be altered while the instrument is passing through the anterior part of the canal, for it is at the posterior part that this form is required; the shaft of the catheter must be kept closely back in the groin, and the penis brought round the curve, so as to preserve the latter until it reaches the deep urethra, when, by well depressing the shaft, the point will rise over any obstruction into the bladder.



FIG. 40.—The bicoudée catheter.

I described and recommended for common use in these cases the coudée catheter. There is a variety of this form which is sometimes useful, and which must therefore be named. It consists in giving the instrument two bends instead of one: hence it is called 'bicoudée.' When the point requires to

be still more elevated than it is in the *coudée*, this form accomplishes the desired position when it arrives at the neck of the bladder (fig. 40).

Now and then a case occurs in which a silver catheter passes with greater ease and safety than any other, and such instruments should be accessible in two or three forms and

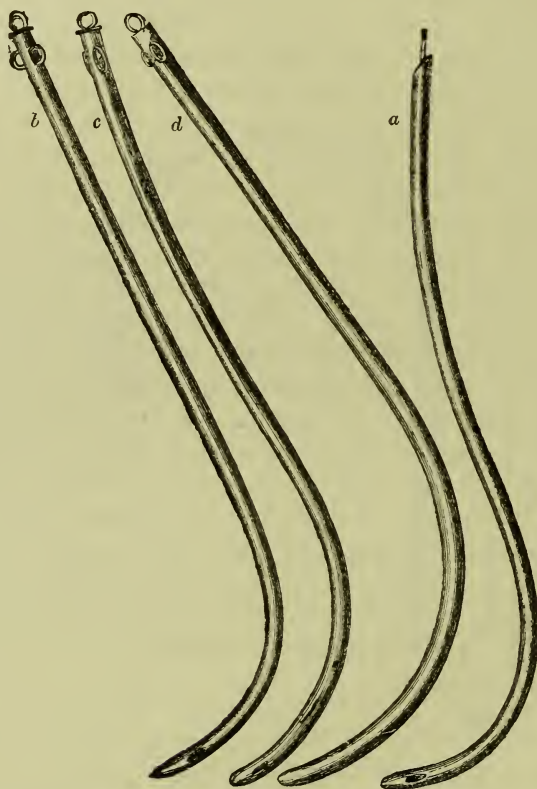


FIG. 41.—*a*, Gum catheter mounted on a stylet of the proper curve for use ; *b, c, d*, silver prostatic catheters, of different curves, representing respectively the Nos. 1, 2, and 3 of the instruments which I employ.

sizes. A prostatic silver catheter should be one or two inches longer than the ordinary catheter : very rarely it is necessary to employ one that is four inches longer. The curved portion, too, is often prolonged ; that is, it embraces a larger arc—say, more than a fourth of the circle (see fig. 41, *d*). The size should rarely be less than No. 10.

How often is the catheter to be passed in the twenty-four hours? The answer depends a good deal on the amount of residual urine. In general terms it may be said that if this amounts to two or three ounces, the catheter may be used every night at bed time only. If double this quantity is found, let it be passed every night and morning. If the larger portion of the urine is retained, it should be drawn off three times a day. And if the patient can pass none by his own efforts, the catheter must be employed as often as the want is declared; and this will rarely be less than five or six times in the twenty-four hours; very often it is more frequent than that.

The general or constitutional treatment of your patient is by no means to be disregarded; but I shall defer a good deal of what I might otherwise say until we discuss the subject of chronic cystitis, which will occupy a subsequent lecture. Cystitis is associated with so many diseases of the urinary organs, that I may as well refer to the treatment under that head, instead of taking it separately, and recapitulating it in connection with each disease. Here, however, let me remark that, in the general management of those who are the subjects of prostatic enlargement, one of the main objects is to prevent the occurrence of local congestions of the organ. You must tell the patient above all things to avoid chills affecting the pelvic region—such as might be produced by sitting on cold seats, exposure to cold; too much excitement, sexual or otherwise; prolonged journeys, or jolting carriages—all liable to aggravate his symptoms; since the prostate very readily becomes temporarily inflamed and swollen, and many of the troubles which the patient experiences depend upon that condition.

A useful agent in these cases, when there is frequent micturition at night, or when pain is distressing at any time, or interferes with the rest, is, of course, opium in some form. The salts of morphia, in small doses by the mouth, sometimes conduce greatly to a patient's comfort. Sometimes a suppository, containing from one-third to two-thirds of a grain of the acetate or hydro-chlorate of morphia, in cocoanut butter, renders essential service. A more certain method is subcutaneous injection, often, however, less convenient to resort to. Some have advised combination of belladonna

with morphia in the suppositories, a combination usually undesirable for the prostatic patient with difficulty in emptying the bladder. Belladonna exerts a peculiar influence to paralyse the vesical expulsive muscles, and when irritation, or want to make water, arises from the presence of urine which the bladder fails in expelling, the difficulty is only aggravated by belladonna. I have seen some painful illustrations of this error. But to revert to the use of opium, the most valuable agent we have in allaying severely painful symptoms arising from prostatic and vesical disease, you must never forget to observe its effects on the appetite and digestion and on the state of the bowels—in some cases considerable. There is great difference in the ability to tolerate opium, in different individuals; although there are very few who are not constipated by it, and who require therefore efficient relief ensured by aperients and by the enema.

And this then is the place to admonish you of the importance in all cases of attending to the action of the bowels. The patient's comfort is generally promoted by regulating their function, for if he is the subject of habitual constipation, and prone to retain scybalæ in the rectum, his urinary symptoms are mostly much aggravated. Very frequently a simple enema of warm water gives relief; but, if necessary, the daily gentle action of the bowels must be provided for by means of mild laxatives, such as senna, manna, bitartrate of potash, sulphur, rhubarb, and soda, or by some of the aperient bitter waters, or by sulphate of soda; whatever will act mildly, quickly, and without irritation, will maintain a condition far more comfortable than that which is associated with habitual constipation. Again, do not forget that these elderly patients, who can take very little exercise, and especially when compelled to use opiates in any form, will generally be materially benefited by an occasional mild mercurial, such as, for example, half a grain of blue pill or less, with three or four grains of the compound extract of colocynth. On the other hand, drastic purgatives produce great discomfort, and are to be avoided.

We shall next consider those cases of prostatic enlargement in which the difficulty of passing the catheter is considerable, and where retention of urine is more or less imminent. It is

by no means uncommon for a patient who has long been the subject of disease of the prostate to be attacked suddenly with complete retention of urine, from the rapid occurrence of congestion and swelling produced by some of the causes above alluded to. The condition is one of extreme distress, often, indeed, of imminent danger. When called to treat such a case, the question of waiting for nature to relieve the patient can very rarely arise, but only of how to do this for him efficiently at once. There are generally evident signs of distended bladder, in the form of swelling and dulness on percussion above the pubes. You will particularly notice if the swelling is high in the belly and very prominent.

As a general rule, in treating such a case, I think you would mostly be right in trying first the *coudée* catheter; if that fails, the overcurved English one, without a stylet as advised at page 124; then, after a careful attempt with these two, an olivary form should first be tried; and, if still unsuccessful, take a silver prostatic catheter, the pattern No. 1, fig. 41 *b*, not the large, long, and greatly curved instrument, only necessary in the rarest circumstances. With the silver catheter, not less than No. 10 (English scale) in size, it is easier to avoid false passages which may have been made by the hands of the patient himself, or by others who have failed in a previous attempt. And in using it always remember that anything felt at the end of the instrument like obstruction can only denote that your instrument is not in the right route, or is leaving it. No force is to be applied in such circumstances. The urethra is not narrowed; it may be, although not commonly, a little close and rigid, when you reach the prostate; but if you find any obstruction, you should withdraw and find another route, to the right or to the left.

Next, in applying a catheter in these cases, remember that the position of the patient himself is by no means a matter of indifference: I mean only when signs that the bladder is greatly distended are present. If these are strongly marked, I advise you to pass the instrument with the patient in the lying position. On the other hand, if the bladder is not much distended, perhaps it is as well, or better, to pass the catheter standing, in which position the viscus is more readily emptied. I have known great danger arise in removing a

large quantity of urine from a patient when in the standing position. I have even known death occur suddenly from this cause. Had I time, I could tell you an interesting story about a case in which the charge of manslaughter was brought against a surgeon in a court of justice, because death had happened to a patient in the circumstances described. The details were all well known to me, for I had been summoned to defend a brother practitioner, exposed, as I thought, unjustly to a criminal charge in connection with the case. It was quite true that a catheter had been passed while the man was in an upright position, and that he fell dead from syncope when six pints of urine had been drawn off; just as a patient with ascites might do if the abdomen were suddenly emptied by tapping in the same position. No doubt it was an error, but nothing could be more monstrous than to make it the ground of a criminal action. It is thus a very instructive case, for precedents of the kind are extremely rare, and I mention it that you may never forget, when the bladder is large, especially in old men, that an attack of syncope, sometimes fatal, may occur in the manner described. I always take care, if I find the bladder is very large, to make the patient lie on his back when the catheter has to be passed. It is advisable also, in these circumstances, to draw off only part of the urine; and after a quart or so has been removed, to wait a little before the bladder is completely emptied.

It may be said, 'Why, in describing the treatment of prostatic retention, have you not mentioned those useful remedies in most urinary troubles and suffering, the hot bath and opium?' I reply that I have not done so in these particular circumstances because, in the condition now under consideration, those remedies, admirable often for younger patients, while they mitigate pain, are ineffective to relieve the bladder of its contents; and furthermore, it is necessary to have a special regard to the future condition of the bladder, after the present emergency has disappeared. Thus, it is by no means unlikely that if the bladder of an elderly man is permitted to remain over-distended, say for a day or two, it will not readily contract again. In the case of such a bladder, thoroughly distended by long retention, the muscular tissue of the organ is very unlikely to recover its power. Although

the patient may have made water tolerably well up to the time of retention, if you leave him to the influence of opium, hot baths, and treatment of that kind, and the bladder is permitted to remain distended, he will be more likely to require habitual catheterism hereafter, or, at the best, to be more subject to attacks of serious retention afterwards than if the instrument had been used at the outset.

Again, supposing that you have experienced extreme difficulty in passing the catheter, it will on the whole be better to leave it in the bladder for a time, safely tied in; but it is not always the most desirable course in these cases. If there is not much difficulty, you should rather withdraw it, and use it again when required; because the prostate is irritated, perhaps injured, by the continued presence of an inlying catheter. Unlike stricture, which is often well treated by the inlying catheter, the prostate is always more or less disturbed by it; although less harm accrues from a flexible than from a silver instrument. Better still if you can pass a vulcanised indiarubber catheter, which is the only one which may sometimes for a considerable time lie harmlessly in the urethra in a case of prostatic enlargement. A small well-polished one may perhaps be introduced by following the hints I have given you; or, failing in that manner, by mounting it on a stylet of any curve which may be desired, and subsequently withdrawing the stylet. It is not difficult to keep it in its place if properly tied in, using the suprapubic hair for the purpose in the manner you have so often seen (see fig. 16, p. 63), and securing it still further with plaster round the penis. This instrument has also the merit of rarely becoming encrusted with phosphates, while its flexibility permits the patient to move about his room. A short metal tube within the stem renders it more secure; or the upper five inches may be stiffened by coating it with collodion, and it can then be easily secured by tying-in. Some have been made with 'wings' at the vesical extremity in order to retain it in place, but these mostly increase the difficulty in passing it and irritate the neck of the bladder.

After a severe attack of retention of urine, and when the patient has recovered from the fever or shock which may accompany it, we become anxious to observe if the bladder is

regaining power, to what extent it may be impaired, or whether the hypertrophied prostate will constitute in future a complete barrier to the outflow of urine by the natural efforts. The inlying catheter being removed, we shall soon discover if catheterism is necessary, and if so, how often it must be resorted to. If any considerable quantity of residual urine is retained, it is usually cloudy and decomposed, and associated with some symptoms of chronic cystitis, often spoken of in these circumstances as 'catarrh of the bladder.'

There is much to be said as to the applicability of catheterism under the varied and manifold circumstances which different patients present. I shall therefore devote the next lecture to the consideration of that subject.

I now proceed to say a few words relative to a question which I think must have already arisen in the minds of some of you, although I have not hitherto made any allusion to it. The inquiry is naturally suggested, Does not the enlarged prostate offer to the enterprising surgeon an opportunity for the skilful exercise of his art, for the purpose of removing some salient outgrowth, or of dividing some obstructing portion, and by this means of affording to the patient an improved or even an unobstructed outlet for the urine? I need hardly tell you that this very obvious suggestion has occurred to the minds of many surgeons; and that too in times long preceding our own. The obstructing portion of an enlarged prostate has been sometimes simply divided from above downwards, when, forming an eminence or barrier at the internal meatus, like a bank, as it were, defining the boundary line between the urethra and bladder, and it is by no means difficult to do this by using a blade which can be unsheathed when it arrives at the spot required (Leroy, Mercier, Maisonneuve). Such simple division was soon discovered to be useless; adhesion took place, and no benefit accrued from the operation, but often much distress to the patient. Then it became a natural and easy matter to carry down an instrument something like a lithotrite, and by means of a double blade to cut a V-shaped piece entirely out of the ridge. This was declared to be useful in a few instances (Mercier); but a careful investigation of the cases, made several years ago by myself and others, has disproved the value of the proceeding, despite the occasional

endeavours by some later advocates, who, not being fully informed of the history of the past, have endeavoured to revive or make fresh claims for the practice. But I observe that quite recently Guyon of Paris has given an authoritative decision relative to the proceeding. He is on the spot, has examined patients thus operated on by Mercier and others, and states without hesitation that the results give no encouragement to repeat this mode of treatment. More lately, too, the same sections of the prostate have been made by means of the electric cautery (Bottini, Pavia), a safer way, no doubt, of effecting the object than by the knife, if such operations are to be done at all.

Then there is another proceeding which one hears of, which takes a less definite form than those just alluded to. Now and then it is reported that during a lateral operation for stone, when the prostate or a growth therefrom has been found in the way, the operator has dealt with it, either by chance or by design, removing perhaps a portion as large as a filbert or more. I have heard it stated, somewhat vaguely perhaps, that the patient, who had been frequently much troubled with retained urine, has on recovery from the operation regained a natural, or nearly natural, control over his bladder. I once, at least, saw the late Sir William Ferguson thus remove a rather large mass. What is more to the point, I have on four occasions myself removed considerable portions of the prostate—twice without intention—when a large outgrowth has been evidently caught with the stone between the blades of the forceps, and so detached in the act of removing it. But I have had the good fortune to operate for stone by the lateral operation on two patients who had been accustomed to pass for a year or more all urine by catheter, on account of advanced prostatic obstruction; and have in each case been able to remove, with the express intention of improving or restoring the function if possible, a considerable portion of prostate, in one of them a complete median portion salient at the neck. These cases were to me occasions of extreme interest, as I keenly watched the results in the sanguine hope that I might find substantial improvement from what I had done. Three of the four cases lived afterwards to test the value of the experiment, and it was not without disappoint-

ment that I found no difference whatever in their condition in regard of retaining power as compared with what it had previously been. My experience then does not support the theory. It has not been so fortunate as that which I have heard occasionally alleged, in general terms it is true, by some persons. General terms, however, mostly denote inaccurate observation or looseness of statement, and I think I am entitled to require that if it does happen, or has happened, to any surgeon to divide or remove any part of an enlarged prostate for a patient who had previously been compelled to pass all his urine by catheter, say for a period of twelve months, and that after the division in question he was enabled to dispense with the instrument, or at any rate to pass, say only half his urine by natural effort, the case ought to be seen and examined by others. I desire extremely to see such a result from any of the proceedings alluded to. I have long wished to see this sight, and have travelled considerable distances abroad and elsewhere expressly seeking it, but at present without success. Such is my report concerning this matter.

And I am bound further to add that the restoration of the function by such means can scarcely be expected to occur, and for this reason. When it has been necessary to practise habitual catheterism for retention from enlarged prostate during a period of one or two years, the coats of the bladder lose their power and are incapable, I believe, of regaining it in almost any case after that lapse of time, and would fail to expel their contents, even supposing the obstruction to be entirely removed. There is good ground for concluding that no operation would restore a *status quo* on account of our inability to restore the expelling function to a bladder which has long ceased to exercise it.

It has been recently proposed to open the bladder above the pubes for the purpose of removing salient portions of the prostate in some cases; and what I have just said in reference to advanced cases holds good equally in relation to this proceeding. No benefit can result to such; in an early stage some relief may perhaps be afforded by carefully removing an obstructing portion. But I suppose few persons, whether surgeon or patient, would be strongly disposed to sanction a suprapubic operation at the commencement of prostatic

troubles on the chance of removing a small growth there; especially as there would be no guarantee that the process of enlargement might not at that stage continue its activity for some time. Still, if any operative aid is to be given of this kind, it will probably be more effective by way of the suprapubic route than by operation on the prostate through the urethra, or by perineal incision. The question of opening the bladder for the relief of advanced cases will occupy a subsequent lecture.

LECTURE XI.

RELATIVE TO THE EMPLOYMENT OF CATHETERISM FOR HABITUAL
RETENTION FROM ENLARGED PROSTATE.

WE discussed at the preceding lecture the phenomena associated with Senile Enlargement of the Prostate, and especially referred to that one which is almost invariably the chief result of this organic change of structure in the organ—namely, an inability, either partial or complete, to empty the bladder by the natural efforts. This inability exists in very different degrees in different cases, and is associated with other circumstances which have an important bearing on the treatment to be pursued. In almost all cases the treatment will sooner or later consist in the employment of artificial means of removing from the patient the ‘residual’ urine. We will therefore commence the consideration of this subject by proposing the question: ‘What are the circumstances which should determine us to employ habitual catheterism for a patient whose enlarged prostate prevents him from emptying the bladder by his own efforts?’

I reply that there are at least two principal facts relating to the local symptoms which must be noted in order to form a judgment for any particular case. Firstly, we must know the amount of ‘residual urine’ habitually present—that is, the quantity left behind in the bladder after the patient has passed all he can by his own efforts; and, secondly, we must observe the degree of frequency, by day and by night, with which he passes water, but especially during the latter period.

In reference to the first particular, the amount of ‘residual urine,’ you will of course not always judge from one trial of the catheter. Where there is nothing to disturb the function of micturition—and it is very easily disturbed, as by the pre-

sence of a stranger, or by the requirement to perform the act for purpose of experiment when a natural want is not present—the amount of urine left in the bladder is pretty uniform on each occasion of micturition with most patients; the conditions just referred to often temporarily impairing the expulsive power, and rendering therefore the residual portion on the occasion of examination rather larger than usual. This understood, let us suppose a case in which eight ounces always remain behind. That quantity suffices, in my opinion, to make it desirable that the patient should at once commence the daily use of the catheter.

But you may find a much smaller quantity; and you are entitled to ask me—indeed, I expect you to do so—‘What is the point in regard to quantity at which the line is to be drawn? When can I say, With this quantity a catheter is quite unnecessary; or, With such a quantity there is no doubt the catheter must be used?’ No exact answer can be given to these questions. The data from which to form a correct judgment are not contained within the terms of the proposition. Other facts are to be ascertained. I have heard it laid down, indeed, as an axiom, that so long as the urine is clear, no matter what the quantity retained, no instrument ought to be employed. A certain amount of *à priori* reasoning may be urged in behalf of such a rule, but it will not bear the test of large experience. The problem presented for solution in this, as in most other cases where surgical interference is imminent, is far too complex to be solved by one unvarying rule. Like the statement respecting quantity referred to above, the single fact that the urine is clear does not suffice to govern your decision. A large quantity of residual urine, much more than a pint, may exist, clear and acid in certain cases, but which, nevertheless, as we shall hereafter learn, ought certainly to be drawn off by catheter.

But let us see what this rule of never withdrawing the urine while it is clear, and waiting until it has become cloudy, means or involves. It means neither more nor less than waiting for the occurrence of chronic cystitis before we use an instrument! No other inference is possible. And why should we wait for chronic cystitis?—a condition which of all others it is highly desirable to avoid in an old and already

incompetent bladder, and which will sooner or later produce thickening of tissues and loss of extensibility on the part of the organ. Is it not, on the contrary, the very condition we desire to avoid, and do mostly avoid, by commencing the use of the catheter at a sufficiently early period? Of course I know full well that in past days, when catheterism necessarily meant the use of the large metallic instrument, often painfully passed, to say the least, chronic cystitis was an ordinary and frequent result of catheterism. But it rarely is so now, with the soft and flexible instrument of moderate size, if only it is used at an early period in the case, and before considerable accumulation of urine has taken place; the removal of a large quantity being mostly, I do not say invariably, followed by local and general disturbance. For it is not so very common to find a patient whose residual urine has, from neglect of catheterism at an early period, reached the quantity of twenty ounces or more, who does not suffer more or less from chronic cystitis with purulent urine, and febrile attacks with resulting debility, whenever the daily use of the catheter, too long postponed, has at length been established. Furthermore, at this advanced stage of chronic retention, a slight accident of some kind readily occasions complete retention, or nearly so; and then it is no longer a question of using or not using the instrument, since the condition is now one which imperatively demands a catheter. In these last-named circumstances, chronic cystitis is almost sure to follow—an occurrence which most probably would not have taken place had there been an earlier resort to the instrument. And so it happens, in the management of these cases of continued and chronic retention due to slowly advancing senile enlargement of the prostate, that the longer the use of the catheter is postponed after the early stage of the malady is passed, the worse will be the symptoms. And unfortunately it may sometimes happen that these serious symptoms following the use of the catheter bring undeserved discredit on the surgeon who first employs it—a discredit really attaching solely, and very gravely too, to the adviser who unwisely prevented an early resort to its aid. So that I beg you to understand that with a quantity of habitually retained urine amounting to five or six ounces, whether it be thick or clear, there is no question in a vast

majority of cases that the time for the catheter to be used at least once, perhaps twice a day, has arrived.

But what other circumstance has also to be taken into account? A very important one—viz. the frequency with which the patient passes urine, and which differs greatly in different cases. It is much more to the purpose for your decision to note whether the patient is disturbed six times in the night or only twice, than whether his urine is clear or cloudy, or even whether the residual urine amounts to four ounces or to twelve. If you find him affected by loss of rest—one of those things which sap the foundations of life in elderly men—pass the catheter the last thing at night for him, and mark the result. If he obtains four or five hours of continuous sleep after the bladder has been emptied—a common occurrence—you have reason enough for persevering, and he will learn to use the instrument himself once or even twice in every night, and will be exceedingly grateful to you for the relief he has obtained. So also the avoidance of pain and spasm achieved by this treatment—a result often to be noted—renders the catheter highly desirable, whether the quantity drawn off be small or large, transparent or clouded by mucus.

Taking into consideration these different phenomena, which vary so widely in different constitutions, you will have little difficulty in arriving at a correct judgment for each individual case, provided you give to each sign or symptom its due importance, and do not rest your decision on any one in particular, unless that one—namely, the quantity of retained urine—happens to be sufficiently marked to leave no ground for doubt as to your course. Still by way of offering you a guide in this matter, I will advise in general terms for average cases, that if the ‘residual urine’ amounts to three or four ounces, the catheter should be used once in the twenty-four hours, and this usually at bed-time; if to six ounces, it may be passed night and morning. If a larger quantity is retained than that passed by the natural powers, the instrument will be required three times in that period. And if the power of urinating be almost or quite lost, the catheter must be used as often as a decided want to micturate is experienced. And in all circumstances, with very rare exception, the patient is sooner or later to be taught to pass the catheter for himself.

I shall now offer you a hint or two on the best method of teaching him to do this, a proceeding of which he has generally had no practical experience. Remember that, under the circumstances we are considering, it is almost certain that he must depend, more or less, on an artificial mode of emptying the bladder as long as he lives. He will probably have to pass the instrument several thousand times, and it is desirable to give him a systematic method, which may enable him to avoid sources of injury, or at least of irritation, liable to affect the beginner who uses the catheter unwisely or carelessly. Few persons, unless properly taught, escape an attack of orchitis or prostatic inflammation at the outset, which less frequently occur to those who have been well trained.

In four instances out of five, the coudée catheter (No. 6, 7, or 8, English scale) is the safest and easiest for the prostatic patient to use. It should be quite flexible, especially the lower half of it, but the upper part, or 'handle,' may be a little firmer with advantage. Let him stand with a steady support to the back, raising the penis slightly with the left hand; then take the catheter, oiled of course, about its middle, lightly between the thumb and forefinger of the right hand, that is, at about five inches from the lower end, and introduce it vertically. In that position let it be passed until the thumb and finger have come down to the end of the penis—that is the first stage of the proceeding. Next, without moving the left hand, which supports the penis, let him shift the thumb and finger of the right upwards along the shaft of the catheter for about an inch and a half, and again push it gently down the urethra, but at the same time gradually depressing the instrument from its previous vertical position towards a horizontal one. Another similar shift of the thumb and finger is to be followed by pressing and depressing as before, until the handle, of which only about four inches now protrude, has sunk slightly below the horizontal level, and points downwards towards the vessel placed to receive the urine. A little more pressure and lowering of the handle will almost certainly be followed by a flow of urine, at which moment all movement of the catheter must cease. When the stream stops, the catheter should be very slowly drawn out about half an inch, reintroduced the same distance, and again drawn out slowly, so as

to empty the bladder completely; the instrument is then to be removed in a vertical direction, or nearly so.

This plan, or any other which you may find preferable, should be invariably followed for a time at first, until the instrument is used almost automatically, as a weapon is used after long drill. In this way, bad and unsafe habits in passing catheters are avoided.

But very often the vulcanised indiarubber catheter passes with greater ease than any other. This can be ascertained in any given case only by experiment. They are now made with a more highly polished surface than formerly; a very important improvement. If a still finer condition of surface could be produced, and the material made into a catheter not exceeding No. 6, 7, or 8 (English), yet containing a fairly practicable channel for urine which is not always limpid, there is no instrument so easy and so safe for a sensitive patient. A highly polished exterior minimises the friction which must occur to some extent between the instrument and the canal it traverses. Moreover, the impediment due to friction is increased in a direct ratio with the length of the urethra. It is diminished, I think, in some cases, when the instrument tapers to a point. Thus constructed, at all events, they certainly pass more easily, and have done good service. Messrs. Weiss have made these for me for some time past.

I revert to a fact, already alluded to, which is one of considerable importance, that although the urine may have been quite clear before the catheter was employed, yet in some instances, after its habitual use has been continued for a short period, the secretion becomes cloudy, and the patient is feverish and unwell. A stage of constitutional derangement, more or less marked, has sometimes to be passed by some individuals when commencing to use the catheter habitually. If the instrument is skilfully managed, this very rarely takes place; almost never in the average or ordinary case. But now and then we meet with a patient who has for a long period suffered severely with frequent and urgent micturition with inefficient relief, and almost constant straining, and who is therefore compelled to resort to the catheter. Probably the first employment of it withdraws a pint or more, and affords a season of relief which equally surprises and delights

him. For, instead of experiencing what he terms 'a spasm' every twenty minutes (that is, an ineffective agonising attempt to pass a few drops), he enjoys an absolutely unbroken interval, afterwards, of eight or ten hours' freedom from pain, during part of which he indulges in the rare luxury of refreshing sleep. The catheter is repeated with similar effect three times a day for a day or two, and then some signs of constitutional disturbance appear. He gradually becomes feverish, his tongue is dry; he loses appetite and strength, emaciates; the urine becomes more charged with pus; he grows feebler day by day, and in the course of a few weeks sinks into a more or less comatose condition and dies. Sir Benjamin Brodie was, I believe, the first to point out, in his well-known lectures, the occurrence of these symptoms, which he attributed to the presence of chronic renal disease. He considered the propriety of abstaining from the use of the catheter when such results might perhaps be anticipated, but came to the conclusion that no other course is possible than that of relieving the suffering patient by catheterism; of course, at the same time, providing against the occurrence of local irritation by all the precautions available. Indeed, there is no other means of saving life, and we are driven by necessity to adopt it. It is impossible to refuse the complete and happy relief which the catheter affords at once to patients who are suffering from the tortures of chronic retention.

When, therefore, an elderly man comes to you complaining that he has long suffered severely from frequent micturition, with pain and difficulty in performing the act, imperfect as it is; that the urine is cloudy, perhaps also offensive—a condition which he may gradually have been taught to designate 'catarrh of the bladder,' and to regard as, in itself, a chronic and intractable malady, you may well suspect that an example of the condition now under discussion is before you. You learn, moreover, that he has consumed vast quantities of medicine, and is as familiar as you are, perhaps more so, with the characteristics of the three famous infusions, Buchu, Pareira brava, and Uva ursi, perhaps with others also, in the vain hope thus to be cured. For, unhappily, it appears that he has been warned by some well-meaning but mistaken adviser to avoid catheterism as a painful and dangerous

proceeding, more likely to injure than to benefit him. You take pains therefore to show him the reasonable need which exists to use it at least once, in its mildest form, with exceeding gentleness and care, if only for the sake of diagnosis. With some reluctance and much misgiving he at length consents, and introducing it after an act of micturition you at once remove five-and-twenty ounces, or perhaps considerably more!

What course are you to pursue? I should speak to such a patient somewhat in this fashion: 'It is a very grave responsibility, sir, that I undertake in advising you. I will, however, consent to do my best for you, but on one condition only, viz. that you implicitly follow the plan I indicate. I ask leave to enjoin absolute rest in your bedroom for at least a fortnight; the greater part of the time to be spent in bed, or almost in the recumbent position; in a warm temperature and with comfortable attendance. I will myself be responsible for the removal of the urine three or four times in the twenty-four hours, using a small soft catheter so as to avoid any chance of exciting irritation in the passages, while you at the same time will gain, as quickly as you can, an insight into the manner of passing it, and as soon as I think you qualified, you will commence, under my eye, to pass it yourself.'

Besides this, careful attention to habits of diet, condition of bowels, &c., is to be paid during this period, and the patient should be cheerfully occupied with some light engagement to pass the time, and be encouraged hopefully in his course. I should advise the removal of twelve or fifteen ounces on each occasion, as better than the complete emptying of the bladder at first; and very little washing-out, if any, should be employed for a week or so. The less mechanical disturbance, the better during the initial stage. An ounce or so of weak boracic acid solution may be thrown in, if the urine is offensive, after a few days' time.

If the patient declines this course, you are rid of the responsibility. I would myself decline the management of the case if, after kindly but firmly expressing my sense of their importance, he deemed my precautions unnecessary, and would not agree to conform to them.

Such is a sketch of what I believe to be our duty in

relation to a case of advanced prostatic disease imperatively demanding the use of the catheter, a case which has arrived at a very critical condition, entirely or almost entirely, because the catheter has not been used as it ought to have been in an early stage.

I have but indicated the course I have myself pursued during the last few years in treating an advanced case, and I cannot speak too highly of the results. Nevertheless, very rarely, notwithstanding every precaution, you will find a case in which during this process the powers of life gradually fail, and the patient sinks. You will almost invariably find in such cases, if an autopsy is made, old-standing pyelitis, with dilatation and marked degeneration of the renal structure, and you will know that in no circumstances could the patient have long survived.

LECTURE XII.

ON OPERATIVE MEANS FOR THE RELIEF OF PATIENTS WHO HAVE
LONG REQUIRED HABITUAL CATHETERISM RENDERED NECESSARY
BY PROSTATIC OBSTRUCTION.

GENTLEMEN,—I propose to call your attention to an extremely distressing and painful condition, for the relief of which our resources, although considerable, have often proved inadequate. I refer to the later stages of complete or permanent obstruction existing at or about the neck of the bladder, and preventing the outflow of urine by any natural efforts. In speaking of ‘obstruction about the neck of the bladder,’ I of course exclude stricture of the urethra, which, moreover, although in itself permanent, only occasionally produces a retention of the urine. When inability to pass water is not only complete but permanent, disease of the prostate is mostly, although not invariably, the cause.

You know that there are some examples of this disease, happily exceptional, in which the capacity of the bladder is greatly diminished, so that the use of the catheter becomes necessary from sixteen to twenty-four times, or more, in the twenty-four hours. Such extreme frequency sometimes occurs as a merely temporary condition, having been occasioned by some accidental access of inflammation. But that is not the serious matter now under consideration; I speak of a permanent affection rendering such relief constantly necessary. It is one of extreme misery for the patient, inasmuch as it entails loss of rest, fatigue, and often also increased difficulty in passing the instrument from injury to the urethra by frequent catheterism. At this period, too, the augmented volume of the prostate sometimes makes the canal difficult to traverse alike for the patient and the surgeon; and if a false passage

be made by either at this crisis, a very dangerous or even a fatal result almost of necessity follows.

A patient in the circumstances above described exists for little else than to pass his catheter. No sooner has he obtained a half-hour's relief than he begins to feel the approach of another act of micturition, and he has to endure much suffering for some minutes at least in the endeavour to postpone compliance with the call as long as possible. His powers are tasked to the utmost, for continuous sleep is out of the question, and health rapidly declines. This hourly recurring obligation and brevity of time for rest form a severe test to the powers of endurance of such patients. Their condition has often reminded me of the almost ceaseless labours expended in a well-known athletic feat which demands so much pluck and stamina—first accomplished by the famous Captain Barclay, and often repeated since—viz. that of walking a thousand several miles in a thousand consecutive hours, a task of no small magnitude. But between the conditions in these two cases there is this wide difference—viz. that in the latter case the subject was in good health and training, knew the limits of his task, and expected a reward; whereas our patient is aged and infirm, and has small ground for hope as to the future of his trial. Indeed, 'the odds' are largely against him in the struggle; and without a very decided improvement in his condition, he must lose miserably, and with inexpressible suffering, his 'race against time.'

The arrival of this stage, then, is the almost certain prelude of death to the patient. Hence I have naturally asked myself, having seen not a few of these cases, 'Can nothing be done, by any operative measures, for their permanent relief—if not, at all events to mitigate severe suffering?' And for many years past I have endeavoured to devise if possible some modes of answering this question in the affirmative,—not, I trust, without some success. At the same time I think it will be conceded that if these should be attended with some little risk, the gravity of the situation warrants an attempt, if only a moderate chance of materially improving his condition appears to be attainable. I say 'permanent relief,' because a temporary remedy exists for some in the employment of an inlying catheter. To tie-in an elastic or indiarubber catheter

is an expedient which may avert the fatal result a little; but it can be only temporary, and it may even aggravate the malady and hasten the end. I assume, also, that medicinal agents, including especially opium, have ceased to suffice for the exigencies of the case. The bladder is, indeed, so organically thickened and diminished in capacity that hourly relief has become a physical necessity.

There are two methods of proceeding I have been led to adopt which are well calculated in my opinion to afford to such patients a considerable degree of efficient, and of more or less permanent relief.

The first method, as the more generally applicable, is, as a rule, to be employed before proceeding to the latter, which is chiefly available as a final resort when every other mode of relief, including the present plan, has been tried and has ceased to be useful. It is only within the last few years that I have adopted a method of examining the interior of the bladder through a small perineal opening into the urethra to ascertain the absence or presence of organic disease in the form of tumour, growth, encysted calculus, &c. This subject is sufficiently important to occupy a lecture by itself, when it will be fully considered. Having, however, I may say, demonstrated the simplicity and the safety of this proceeding, I thought it might be available also for those cases of extreme prostatic irritation which I have just described. It appeared not unlikely that this painful condition might be in part due to the repeated catheterism necessary to afford relief to an incapable bladder, and imperatively demanded by the organ when it is inflamed and hypersensitive. The cystitis on the one hand, and the catheterism on the other, exercise mutually inimical influences, and the patient becomes the victim of a vicious circle of actions, in which an absolutely indispensable remedy, the catheter, aggravates the inflammation of the bladder, which therefore, in its turn, demands the instrument with increasing frequency. It occurred to me, then, that, were it possible to suspend all action on the part of the bladder for a few days, to prevent accumulation of urine within the organ, allaying the constant and painful want to pass urine, and also at the same time to abolish the frequent catheterism altogether with its irritating effect on the urethra,

the inflammation of the bladder might subside, and that its tolerance of the presence of urine might largely increase. And I hoped that a state of things might be subsequently brought about similar to that which is present in a less aggravated stage of obstruction, when catheterism is not needed more than six or seven times in the twenty-four hours. If, in place of hourly relief by the instrument, an interval of three or four hours could be made to suffice, an enormous boon would be conferred on the patient.

Accordingly, under the influence of this conviction, I seized an early opportunity of making a small opening in the perineum, in the manner hereafter to be described, for a patient who was passing the catheter every hour, and whose vital powers were at the lowest ebb from constant suffering and loss of rest; and I introduced an indiarubber catheter into the bladder through the perineal opening, so that the urine might flow off continuously into a receptacle as fast as it reached the bladder. In this way I ensured complete rest to the bladder in relation to its function of containing and expelling urine, and to the urethra from its hourly exposure to instrumental irritation. The relief was immediate and most remarkable. He enjoyed long refreshing sleep, and was unconscious of any pain, while the urine itself, which had been charged with muco-pus and blood, and had been offensive in the highest degree, assumed in the course of a few hours a healthy colour, an acid reaction, and was almost clear. In two or three days the patient rapidly regained appetite and digestion, became cheerful, and showed a change for the better which no one had been sanguine enough to anticipate. On the eighth day I removed the catheter from the wound; during the next two days urine issued by that route at intervals of some hours; but the wound, which was very small, rapidly closed, and the catheter was of course again necessary. But the passing of the instrument was now no longer painful, the bladder was not inflamed, and could henceforth retain urine three or four hours without inconvenience, while the patient himself in less than three weeks from the operation was enjoying active exercise out of doors, having been before confined to his room in the suffering condition which has been described in general terms above.

In each of three other cases, with similar symptoms for which I made the perineal opening, I discovered a small encysted calculus or calculi, which had been the causes of severe and long-continued suffering. The presence of these had been barely suspected, the sound had not revealed it, and could not have done so, on account of their position, and without the operation they must have remained unremoved.

In many other cases I have performed the same operation for obstinately persisting subacute and painful cystitis, and for instances of severe and painful paroxysms or spasms of long-continuance without known cause, obtaining excellent results for most of them. In some, the antecedent condition has more or less returned: in a very few, little benefit has ultimately accrued, after the primary relief which almost invariably is experienced, has subsided. In one instance only has a fatal issue followed, but that was in the case of a patient already worn out, and who assented to the proposal at a period too late to ensure a successful result. Moreover, if done with ordinary care, it is impossible to regard the proceeding itself as exposing the subject of it to any danger of a serious kind. And if you afford no relief—a result which I have never met with, and can hardly suppose to be possible, inasmuch as, for a time, at all events, the hitherto painful catheterism is suspended—you may feel very certain that no injury will be inflicted on the subject of the operation.

The mode of operating may be briefly sketched as follows. I shall give the details more fully in a subsequent lecture (see Lecture XXIX.). The patient being placed as for lateral lithotomy, an incision is made in the raphé of the perineum on a median grooved staff. Having placed the left index finger in the rectum, a long straight knife is introduced, edge upwards, about three-quarters of an inch above the anus, until the point reaches the staff at the membranous portion of the urethra, which is divided for half an inch or so. The left index finger is now removed from the rectum and enters the urethra on the groove of the staff to the neck of the bladder as the staff is withdrawn. If when exploration has been completed, nothing is found to be removed, a large vulcanised indiarubber catheter, say 18 or 20 in size (English scale), or tube, with its extremity just within the bladder, is fastened in its place

by tape or bobbin to a bandage round the waist. Here it should be retained from seven to ten or twelve days, or even more according to the circumstances; thus, if the patient derives great comfort and relief from the instrument, it may be retained for a considerable time.

The second method is one which I first employed in this hospital, and have since practised in a few cases with satisfactory results. It is indeed just nineteen years ago¹ that I decided, in order to relieve a man in Ward 7 who was suffering severely in the condition above described, to introduce a tube into his bladder above the pubes, to be permanently retained there as the constant channel for the urine; just as a tracheotomy tube may serve some patients for years as the only channel of air into the lungs. This proceeding differed from the ordinary suprapubic puncture of the bladder in not being put in execution at a time of urgent retention, but when, on the contrary, a catheter could be readily passed, and has to be passed, indeed, too often. The operation was performed upon the end of a sound already placed in the bladder, much after the manner of the high operation for the stone by the old method. For, in these cases, it must be remembered that the bladder is by no means distended with fluid, but may, indeed must be, nearly empty—a widely different condition, as regards operation, from the ordinary puncture. Moreover, the viscus is often altered in position or deformed by masses of prostatic growth rising into its cavity, and sometimes even nearly filling the pelvis. I believe that puncture has never before been done or recommended with this end in view—viz. to avert death by establishing a *permanent* outlet for urine when the urethra is no longer practicable through disease of the prostate and bladder. I do not overlook some two or three examples of retention of urine from stricture which were relieved by suprapubic puncture by my friend Mr. Thomas Paget, of Leicester, and in which the tube subsequently became for several years the permanent channel by which all urine passed. In these cases this method of relief was continued only because the stricture was subsequently found imperme-

¹ I did this in January, 1869; and, having repeated the proceeding several times, proposed it first in a lecture here in 1874, which was published in the *Lancet*, Jan. 2, 1875.

able to the catheter, and the patients were content with the tube and preferred it to any further operative measures to overcome the stricture. The suprapubic punctures, however, were not intended by the operator to be permanent, nor were they designed for prostatic retention at all; but it was the comfortable condition of these patients, whom I saw, which led me to think of the analogous proceeding to relieve extreme prostatic difficulties.

The operation originally consisted in passing a large sound, hollow throughout, with a strongly marked curve, like that at A (fig. 42), closed by a bulbous-ended stylet (B). The instrument was introduced by the urethra until the end could be felt just behind the symphysis pubis, and was then confided to an assistant to retain in its place. An incision was made not more than an inch in length, enough to admit the index finger, in the median line at the upper margin of the symphysis. The tissues having been separated by the finger, and the linea alba divided by the point of a bistoury, the finger was passed down closely behind the symphysis, and, when the end of the sound was clearly felt, an opening

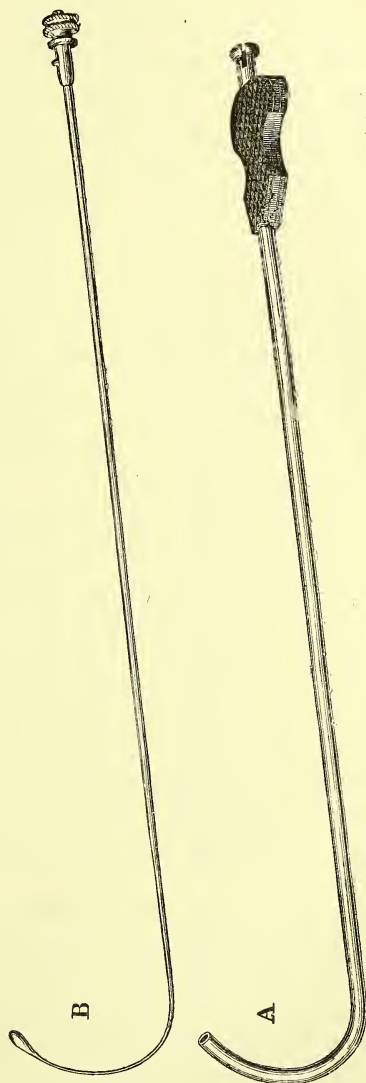


FIG. 42.—A, Hollow sound, the end of which, when stopped with the stylet (B), is introduced into the bladder, and forms the point which guides the operator in the last incision. Size about 12 or 13, English scale. B, Bulbous-ended flexible metal stylet.

made so as to expose its point. The operator now, taking the handle of the sound in his left hand, made the end protrude in the wound, the bulbous stylet was withdrawn, and a flexible tube about three or four inches long was passed into the hollow channel of the sound. The withdrawal of the latter by the urethra necessarily ensures the passage of the elastic tube into the bladder, and leaves it there.

Then subsequently I preferred to make a small incision in the manner of modern suprapubic lithotomy, so as to form an opening directly above the symphysis in order to find the way close behind it to the end of the sound there, and incise enough to allow this to be pushed up into view. The insertion of the tube into the hollow of the sound, and the withdrawal of the latter, as already stated, brings the tube into its place. And when, after the lapse of a day or two, the passage is established, the tube may be temporarily removed and replaced easily enough.

Now, instead of giving you any details of the cases in which I have thus operated, as I have sometimes done, I may say in general terms that the result has been always advantageous in a certain degree. It is unquestionably a proceeding capable of mitigating the sufferings of an aged and infirm patient, to whom hourly catheterism is a slow but fatal form of torture. In order to be of real service in the way of prolonging life, and rendering it fairly comfortable, the operation should be resorted to at an earlier period than has usually been chosen, certainly at a stage before the last painful manifestations have appeared, or have given notice of their approach.

But I am about to propose a modification of the proceeding which I believe will render it more valuable. About three years ago I performed 'digital exploration' for an advanced case of constant and painful catheterism, and removed six encysted calculi, draining the bladder afterwards with great relief to the symptoms; but in about three-quarters of a year I was again consulted owing to their reappearance. I then decided, instead of making the puncture above the pubes described, to perform the suprapubic section as for lithotomy, having complete confidence in the safety of the modern operation, so as to enable me to lay open to view and examine every

part of the bladder, and then let it heal so far as to admit a tube, through which in future all the urine should pass. I did so in June 1886, and found the mucous membrane of the bladder coated for the greater part with a dense fibrinous deposit, often met with in old-standing cases, and firmly adhering thereto much phosphatic grit; this with considerable trouble I detached, removing the whole. The wound now rapidly diminished in size, and I was soon able to carry

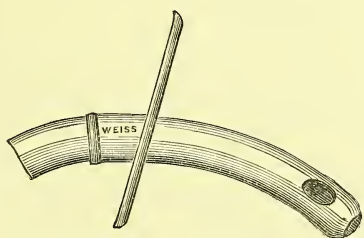


FIG. 43.—The shield, seen in profile, with the flexible tube, about 3 or 4 inches long, passing through.

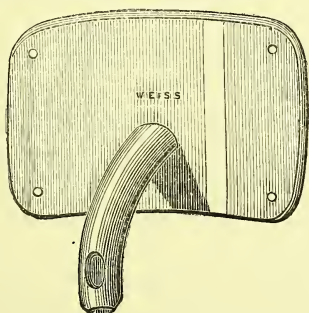


FIG. 44.—The posterior aspect of the shield, showing the flexible tube which passes into the bladder. The shield is fully $2\frac{1}{2}$ inches in length.

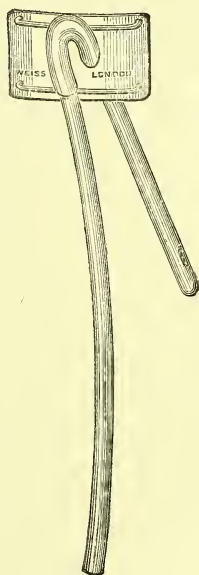


FIG. 45.—Mr. Browne's modification of the foregoing for permanent use.

out my intention of enabling the patient to walk out of doors in about a month's time. To the suprapubic region was fitted a silver plate, with an opening in it transmitting a silk gum tube, No. 20 English scale (figs. 43 and 44), which projected less than an inch on the outer side, and was inclined downwards two or three inches on the inner side, thus conveying from the bladder all the urine as soon as it arrived by the ureters. To the tube on the outer side was attached the

ordinary urinal worn by persons requiring such a convenience, and into it all the urine passed without leakage or trouble. After a little adjustment the contrivance answered so well that the patient went abroad and spent the winter there in the enjoyment of health, walking three or four miles daily. He has continued thus, with slight occasional troubles, to the present time (autumn 1888), and has not used a catheter since. He removes and cleanses the tube once daily, and washes out the small cavity which remains as a bladder, for the pelvis is largely occupied by a prostate almost as big as a cocoanut. He has no pain, and has long given up the use of morphia, which he formerly consumed in large quantity. In similarly exceptional, or even in some less severe cases, I should not hesitate to advise the same course. Its great value consists in the opportunity which is afforded of completely removing the fibrinous layer with its earthy constituent; a dense cohesive material which resists the action of the injecting bottle and lithotrite, and constitutes indeed the most obstinate form of phosphatic deposit, and the unfailing cause of recurring calculus in the bladder.

Fig. 45 shows a little modification of the shield suggested by my friend Mr. G. B. Browne, which has been found useful. Its chief value consists in the fact that the confining strings slide freely under two bars on the face of the plate, instead of being fastened to holes in it. The plate is, therefore, not dragged in any direction by the strings, and it maintains its place in any movement of the body.

I now look forward, gentlemen, with more hope than at any former period of my professional experience, in the resources of our art for effectually relieving a class of cases by no means uncommon, but hitherto producing more suffering at a late period of their history than any others which come before us; cases of malignant disease alone excepted.

LECTURE XIII.

RETENTION OF URINE.

GENTLEMEN,—We shall study to-day the condition familiarly known as Retention of Urine; a condition which affects the subject of it with a degree of physical suffering and mental distress quite peculiar in their nature and intensity. If you are capable to some extent of realising what the condition of a patient is who experiences complete or almost complete retention, you will feel how important it is to relieve him, not only as easily, but as rapidly as possible. And there are very few cases in which you will meet with more gratitude if your treatment is skilful and prompt. For not merely are the patient's physical sufferings extreme—and I suppose every man who has been so situated as to be unable to relieve a distended bladder, even for a short time, has had some glimpse, though only a faint one, of the distress occasioned by inability to pass water for several hours, or even for days—not only, I say, is the pain intense, but there is extreme anxiety of mind also. He fears that the bladder may burst (a circumstance, however, of exceeding rarity), and he always looks forward with gloomy forebodings to the terrible consequences of not obtaining relief.


Now, while retention of urine is very common in the hospital, it is not so in private practice. The circumstances of exposure to weather and to other risks through the hazardous callings of the men who ordinarily become hospital patients, determine this difference; when, therefore, retention is met with among the higher classes it is always a very grave matter, although in all circumstances, wherever encountered, it will often demand the exercise of your highest skill and judgment. Then, again, if you are successful, the relief which you afford is instantaneous. It is not like the questionable result of a

dose of medicine, which a sceptical patient may persist, sometimes almost with objectionable pertinacity, in attributing solely to our great ally—the curative power of nature. There can be no uncertainty as to the result of the treatment if, after twenty-four hours of agony, relief follows your dexterous use of the catheter, and when the two or three pints which the patient was unable to void are withdrawn by the magic power of your hand. He tells you that he is in ‘heaven’—a common expression with such patients—and he never can entertain the slightest doubt that you were the author of his ‘translation.’

Retention of urine comes before us in three typical forms, each requiring a different species of treatment. There may be some instances which cannot absolutely be so classed, and some the characters of which belong equally to two forms; still, for convenience, it is desirable to adopt this classification.

First of all, you may meet with retention as it occurs in a young and healthy man who has no stricture, but who is the subject of temporary local inflammation; secondly, it may occur in an older man who is the subject of confirmed organic stricture; and, lastly, it may occur in a man who is neither young nor hale, and who has no stricture, but has an enlarged prostate. Of the last I shall have nothing to say; we have already discussed that subject, and the mode of relieving retention in connection with senile enlargement of prostate. But I shall ask your attention to the two other conditions—namely, retention from inflammatory swelling obstructing some part of the canal, and retention arising from organic stricture.

Of the first form of retention, a typical example will probably furnish you with a history something like the following. Within a month or six weeks the patient, who is generally a young man, has had gonorrhœa. He obtained considerable relief at the outset from treatment, and has in consequence allowed himself some relaxation of the regimen to which he has been lately submitting. Thus, perhaps, he has recently indulged in the use of alcoholic stimulants, has taken some unusual amount of exercise, a game of cricket or the like, and, after being overheated, has been sitting on a cold stone or damp grass; or, lastly, he may have exposed himself to some



strong emotional excitement. Under those circumstances some deep-seated inflammatory swelling producing obstruction, often hastily termed 'inflammatory stricture,' may be produced. Now let me say, repeating what I have said in a previous lecture, that that condition has no right whatever to be so designated. An inflammation affects the prostatic region of the urethra, and involves, therefore, the neck of the bladder; a region in which you know 'stricture' is never found. The result of this, the inflammatory process, is some fulness or swelling of the prostate, as may be ascertained by rectal examination—a condition not in the least resembling stricture; that is, it is not a circumscribed narrowing at a particular part of the urethra, but a general tumefaction of the gland, which more or less closes the canal, and prevents the expulsive apparatus of the bladder acting and discharging its contents. Such is usually the condition in what is called inflammatory or spasmodic retention.

This condition of the prostate much resembles that which affects the tonsils in acute tonsillitis, and which is popularly termed inflammatory sore throat or quinsy. Both complaints consist in the enlargement of glands which more or less surround narrow passages, and which thus interfere with the functions of those passages by obstructing them; both occur rapidly, and may be produced by unusual exposure to external cold.

Now, what are the early signs of inflammatory retention? First, there is usually some cessation of the gonorrhœal discharge. Just as in the case of orchitis, where the urethral inflammation is supposed to subside and to attack one of the testes—since simultaneous disappearance of the discharge occurs—the inflammation of the prostate is also preceded by diminished urethral discharge. And supposing that you make a rectal examination, a tender, heated, and swollen condition of the prostate will be discovered. The patient complains that the stream of urine grows smaller and smaller, and in a very short time he loses altogether the power to relieve himself. He becomes feverish, restless, and suffers severe pain about the lower part of the abdomen and in the perineum. Those who are the subjects of stricture may have become in some measure accustomed to difficult micturition and a degree of

retention ; but when an active young fellow is thus attacked for the first time, he is in a state of extreme distress.

Now, as to the treatment of such a case. The patient desires ardently to be relieved immediately, and declares he cannot endure his sufferings. You see him bent nearly double in order to relieve the pressure of the abdominal muscles on the bladder, and he is even breathing shortly and quickly to avoid their action there. The old treatment in such cases—the classical treatment of fifty or sixty years ago—was bleeding from the arm or perineum, repeated hot baths, and large doses of opium, so as to enable the patient to bear the pain and dispense with the catheter. The reason assigned was, that in an inflamed state of the canal you might do more harm than good with a catheter, and that it was therefore better to mitigate pain by the means described. I have told you that I dissent from that treatment altogether, although it was not so long ago employed to some extent. For, first, you must not only regard the present emergency, but also the possible occurrence of serious after consequences ; for if a young man is allowed to remain for thirty-six or forty-eight hours with an unrelieved bladder, because you fear to use an instrument, permanent mischief may be done. I have seen patients who have been unable to empty the bladder for years after treatment of this kind. Extreme and continued distension of that organ sometimes destroys or permanently diminishes its contractile power, and produces a condition which is properly termed ‘ atony of the bladder.’ Therefore, if you pass the catheter, even at the risk of doing a little mischief to the urethra, I am disposed to think you would be wise in incurring that little risk rather than expose the patient to the other danger. But then it ought to be done without such risk.

For my own part, I always take a small flexible slightly coudée catheter—one not above No. 6 (English scale), as a large one gives in these circumstances unnecessary pain—or it may be an ordinary gum elastic catheter, which has been tolerably well curved in the way I have before described, since it has to enter over a swollen prostate. With the former instrument especially there is generally no difficulty in relieving the patient, who is exceedingly grateful for what you have done ;

whereas, if you put him through the long process, and he relieves himself ultimately, he thanks you for little, comparatively speaking, and he runs the risk to which I have referred. But, lastly, in the event of flexible catheters not passing, you should try a silver catheter of the same size or a little larger.

I believe one of the first persons to denounce the old plan of bleeding and hot bathing was Mr. Guthrie, formerly surgeon to the Westminster Hospital, an authority ranking only second to Brodie in his day. If you turn to the racy writings of that experienced and practical surgeon, you will find an anecdote in connection with this subject. He relates the account of a visit which he paid to a patient in the circumstances of retention I have described, and also the reasons, in strong and graphic language, why he then gave up for ever the bath and bleeding practice, and passed the catheter at once for such cases in future.

So much for the inflammatory condition of the prostate producing obstruction to micturition. I need not refer at any length to spasmodic retention, which rarely happens. At the same time it may be admitted that there is no doubt that when an inflamed condition of the urethra exists, spasm of the muscles may coexist; but the precise share which each takes in contributing to the result will not influence the treatment, which in either case should be that I have indicated.

Now I come to the second form of retention—viz. that depending upon organic stricture. Here we generally have to do with an older man, because it is rare to find a young one suffering from confirmed organic stricture. As a rule, to which there are exceptions, the patient in question has mostly had stricture ten or twelve years before he is the victim of complete retention. First of all you have to ascertain that the cause is certainly stricture. You will probably find that he suffers less acutely than the patient just described, although his condition is a painful one; for the progress of the case has been more gradual, and the derangement has not necessarily been brought on by any great or sudden imprudence. He has been passing water with difficulty for weeks or months, and at length some slight cause perhaps has produced almost absolute retention; the ‘last ounce,’ so to speak,

'has broken the camel's back.' Or it may not be absolute retention as in the preceding case; there may be some dribbling, indeed the patient may have been relieving himself in that inefficient way for days, but the bladder is greatly distended, and to all intents and purposes his case is one of urgent retention. Not improbably you may also find that the patient is accustomed to instruments. Now, what you have to do is to take an instrument of middle size, and pass it down to the seat of obstruction, in order to learn where it is. You may very likely meet with some narrowing near the orifice, and this being passed, the real difficulty may be met with at about four or five inches from the external meatus. You should then take the finest gum elastic catheter and endeavour to insinuate it into the bladder; and if you are sufficiently fortunate to accomplish this, you should tie it in at once, so that you may have no further trouble. But such a result, so speedily attained, would not constitute a very difficult case of retention. Supposing you are unable to pass the gum catheter, I should then recommend a small silver one, either No. 1, or smaller, to be used in the manner I described to you in Lecture VI. Notwithstanding all your skill, and that perhaps of friends whom you may have called in, the instrument is still not passed. There may have been false passages (it is very easy to make them), and there may be such difficulty, mostly increased rather than diminished by repeated attempts which are not successful, that it is almost impossible for any one to pass a catheter after your failure.

We then come to the question: What is to be done next? No doubt for some of these cases much may be effected by opium and hot baths. Suppose the water is dribbling off, and you shrink from the last resource—that is, puncturing the bladder, or other operation to relieve the retention of the urine—a safe middle course may still exist for some of these cases. The patient up to this time may have been exposed to cold; if so, he should have the benefit of a warm bed and hot baths, with large doses of opium—and you must be very liberal with opium if you use it at all—so as materially to mitigate the involuntary straining, which he can no more help than he can help breathing, and which is utterly unsuccessful as regards evacuating the bladder, often making the situation

rather worse than better. But the result may be that the water will dribble off more freely than before, and you may find, after two or three days, that it will come in a larger stream, and that you can then pass the instrument without much difficulty. The patient may often be saved an operation thus, if there are grounds for declining to perform it. On the whole, however, I do not advise waiting very long; still it is better that the patient should be temporised with in that way than that he should be damaged by an unsafe hand, either by the knife or catheter. Most men, indeed, are quite sufficiently confident in their ability to use instruments when they have a patient that cannot make water. Still, if you are convinced that you are not doing any good with the catheter—still more that you are doing mischief—you can in most of these cases successfully employ opium or an inhalation of ether, with hot baths and fomentations—that is, as regards the immediate and urgent condition.

But we will assume that you have done all that you can do in this way, and that the question of relief by some other means must be met. The bladder is increasing in size, notwithstanding your treatment. You examine the suprapubic region carefully, and find a tense and perhaps large tumour there, reaching to the umbilicus, or nearly so, more like a uterus than a bladder. Now, a method has been devised within the last few years, by which you can at all events easily, speedily, and safely afford temporary relief. I refer to Dieulafoy's capillary trocar and exhausting syringe. By means of a minute puncture above the pubes, the distended bladder may be emptied when the condition described has been reached, or even sooner if thought necessary. And it is an operation which may be repeated daily a few times during an emergency, affording time, possibly, for the stricture to become less tight and for a catheter to be introduced. But if this treatment does not meet the exigencies of the case, a more permanent opening into the bladder must be made by some other operation. Furthermore it is not to be forgotten, in examining the patient with this view, that in some old cases of stricture there is not necessarily much suprapubic dulness, for the bladder is thickened and contracted. Introducing the finger into the rectum, a swelling there may be found, produced by the

distended bladder, and here you are to seek the sensation of fluctuation. If, placing my hand above the pubes, I feel a distinct wave communicated to my other index finger in the bowel, I know that to be a point at which the trocar can be inserted with safety; and if a well-marked rounded tumour over the pubes which is dull on percussion does exist, with the bowel-note around it clear and distinct, I have reason to believe that an operation over the pubes would be successful. But then another question naturally arises: Why not attempt to relieve the bladder by a dissection to the urethra itself from the perineum, so as, if possible, to cure the stricture, and at the same time relieve the bladder? Might it not be wise in this manner, as it were, to kill two birds with one stone, that is, to relieve the retention and divide the stricture by one operation, and not to be content with merely puncturing the bladder by the rectum or above the pubes?

At this point let me revert to the different practice and different experience of surgeons in relation to this matter. Let me give you the experience of the late Mr. Liston. He once said, speaking from this chair, that during the whole of his connection with the Royal Infirmary of Edinburgh, and subsequently with this hospital, up to the time at which he spoke—namely, three or four years before his death—he had never punctured a bladder for retention of urine. On the other hand, there are men living in this town who have punctured a bladder fifty times or more. Mr. Liston intended to imply that a good surgeon ought rarely to find it necessary to resort to any other means than the catheter in circumstances of retention. But do not suppose for a moment that the gentleman I spoke of who has punctured a bladder fifty times, does so because he fails after long or repeated trials to pass the catheter under those circumstances; he prefers to operate by puncture because he thinks it wiser to do so than to persevere too much with the catheter. Then, again, both Liston and Guthrie occasionally performed the perineal operation just spoken of. From the perineum the urethra *may* be reached behind the stricture. Now, without entering into a long discussion on the subject, I may say that this mode has lost favour of late years. It is not always easy to cut directly down upon the urethra behind the stricture; indeed, the

surgeon may make a serious wound in the perineum, and never arrive thus at the urethra at all. Then it is by no means certain that it should be necessary to make an incision through the obstruction, so far as its cure is concerned ; for the stricture, when the time comes to treat it, may be amenable to dilatation. The reason why puncturing through the rectum was done so often by Mr. Cock, of Guy's Hospital, is that he conceived it to be an excellent form of treatment for the stricture. He said : 'Let us withdraw the urine from the urethra altogether for a few days, and the urethra will recover itself, so that we may be able to cure the stricture with ease.' And that is often true. While all the urine passed by the rectal tube, the urethra lay fallow, so to speak ; that is, it was totally disused for a time, and the swelling and soreness of it subsided, and then in a short time the instrument could be passed—say No. 3 or 4 catheter, although before you could not pass No. 1. This, then, is a species of treatment of stricture, when subjected to the crisis of retention, which Mr. Cock introduced ; and, at all events, he proved that the operation, by his large experience of it, was less hazardous than it had generally been supposed to be.

My own experience of puncture of the bladder for retention of urine is, for prostatic enlargement three, and for retention from stricture four times, besides using Dieulafoy's instrument twice only : this is during a period of above thirty years. Two of the former were suprapubic punctures, all the others were by the rectum ; on all other occasions I have succeeded by means of the catheter. I should add, that two of the rectal punctures were on the same individual, once in 1859 and again in 1870, he particularly requesting me to operate on the latter occasion as I had done on the first, because the relief was so speedy and complete. But for this circumstance it is almost certain I should have succeeded with the catheter. No doubt the rectal puncture is the safest operation in most cases when the bladder has to be opened. On the other hand, a very considerable enlargement of the prostate makes the suprapubic operation necessary. In the one case in which I did it for prostatic retention, that organ filled the pelvis : it was the largest I ever saw : the bladder had long been emptied only by a fourteen-inch catheter, and with difficulty.

Following a suggestion made many years ago, I once punctured through the pubic symphysis—a method I shall not further allude to—and failed to find urine.¹ I punctured immediately after by rectum and gave relief, the patient recovering.

There remain then for consideration the puncture by the rectum, and that above the pubes (see fig. 46). By carrying into the bowel your finger—a reasonably long finger—you arrive at a point just behind the prostate. The other hand is placed above the pubes, that the wave of fluid, by its pressure, may be distinctly felt by the finger in the rectum. If you do



FIG. 46.—A section of the pelvis showing bladder and rectum.

so feel it, you may be very certain that your action will be safe. Along this finger, kept firmly in place, your trocar is slipped, and then boldly, but carefully, pushed into the bladder. Nevertheless, the moment is always rather an anxious one, because, if you have not hit the bladder, it is a serious matter to have thrust a long instrument into the centre of the body,

¹ It may be as well to state what was the probable cause of the failure. A puncture through the symphysis, which is solid bone in an elderly man, blunts the trocar so much that when the point arrives at the soft tissues and bladder on the other side, it may not penetrate, but pushes them away. At least this is what happened in three experiments I made on the dead body, for the purpose of observing the result.

only to find no urine escaping. Before operating, be careful to place your patient in the most commodious position. Let him be seated on the edge of a bed, his back supported by pillows behind, the legs apart, each on a chair; an assistant by him placing one hand on either side above the pubes, so as to steady the bladder, and press it gently down towards the rectum. Then, after all the urine has been removed, remember to make the canula quite secure in its place, for if it slips out subsequently, you will not be able to get it into the same opening again. The muscular fibres of the bladder instantly close, and you have to make another puncture—not a matter of much consequence, but better avoided. When it is necessary to maintain the opening patent for a few days, you may, with a little management, replace the metal canula by a flexible catheter, which is much better borne in the bladder and bowel than is the former instrument.

For the suprapubic operation you divide the structures in the middle line until you reach the linea alba. Then carefully making your way deeper, you will soon discover fluctuation; and, having the bladder steadied as before, you will thrust the trocar slightly downwards. In this case you retain the silver canula for two or three days; but you may soon substitute a gum instrument. Now, supposing there is a probability that your patient may require this artificial relief by tube for some time, you will, of course, prefer the situation above the pubes, because it is much more easy to wear the tube there than it is in the rectum, as we saw by a striking illustration at our last meeting.

LECTURE XIV.

EXTRAVASATION OF URINE AND URINARY FISTULÆ.

GENTLEMEN,—Before commencing the subject of urinary fistulæ, I shall ask your attention very briefly to a condition closely related to retention, just considered—viz. Extravasation of Urine. And it is related in this way: Let us suppose that from inability to obtain proper surgical treatment, or from neglect or mismanagement, a patient suffering with retention from stricture has had no relief, and that you are called to see him for the first time in this condition. On examining him you no longer find a distended bladder occupying the lower region of the belly; but you observe a very manifest swelling in quite another region, which you learn has somewhat suddenly appeared. In fact, it is obvious to you that any question of puncturing the bladder, one which a few hours previously had probably been pressing for a solution, is no longer present, since the overstrained organ has been already relieved by a natural process. In the absence of the surgeon, Nature herself has taken a step towards accomplishing a cure, a rough and clumsy one no doubt, but still a forcible, and in some sense an efficient effort for the preservation of the patient's life. For it is certainly true that many subjects of stricture of the urethra causing absolute retention of urine, must in consequence thereof, without surgical aid, lose their lives; yet there is a certain notable proportion of persons thus affected to whom existence is assured by the occurrence of that condition which we call extravasation of urine.

What then takes place is this: after long-continued and repeated efforts to empty the bladder, the urine is driven into the prostatic and membranous urethra, violently distending it, or other portion of it lying behind the point of occlusion by the stricture. The thin walls anterior to the prostate become

more and more expanded, and these at some point give way, usually at the moment when an uncontrollable paroxysm of straining occurs, and through the rent so made a quantity of urine is driven with great force into the cellular interspaces. But as there is no outlet for this great rush of fluid, it makes its way of course in the direction of least resistance, and where this is you may easily divine. You may predicate exactly where, owing to the anatomical disposition of the fascia, the fluid must go—viz. into the scrotum, into the integument of the penis, up into the groin above Poupart's ligament, rising upwards over the belly. Occurring, as it usually does, in the bulbous part of the urethra, where the walls of the canal are weak, the urine cannot pass backwards behind the scrotum, or the back part of the perineum; neither can it get into the thighs, because there it is checked by Poupart's ligament. First of all it enters the loose cellular connections between the anterior muscles of the perineum, and into the scrotum and penis, distending them enormously, so that the former may soon become as large as a cocoanut or a child's head. From thence it rises over the pubes, over the front of the lower part of the abdomen, the rising tide being distinctly marked by a flush of redness, as well as by the swollen bloated appearance of the parts. I have seen it rise as high as the chest, and I have made incisions to evacuate it, in a severe case of extravasation, as high as this point. When, therefore, this accident has taken place, it follows that at every action of the bladder more urine is driven, so that the mischief described is constantly increasing until relief is afforded.

Generally, you ought to know at once, by the appearance of the patient, what has happened, although it is possible sometimes to confound the condition I speak of with ordinary inflammatory cedema of the scrotum, for extravasation may commence gradually and insidiously. In an ordinary case you will probably find the perineum tense, a large red scrotum, the penis greatly swollen, with a faint sign of extension over the border of the pubes. In order to ascertain the true state of things, you must ask for the antecedents, and you will probably learn that there was great difficulty in passing urine, followed by rather sudden relief. When a man has had retention for some days, and extravasation suddenly takes place,

instant relief is experienced—the frightful want to make water disappears as soon as the fluid finds its way into the scrotum ; but he soon feels new pains, not necessarily very severe, and, what is worse, constitutional symptoms rapidly set in. The poisonous fluid quickly destroys the cellular tissue, and with it the vascular supply to the integument, so that sloughing soon begins. After thirty-six hours or so, gangrenous discolorations appear, and the urine may find its way into the corpus cavernosum, when a dark spot appears on the glans, showing that the structure of the penis itself is infiltrated, and that mortification of a portion has taken place.

When it is determined that such extravasation is present, the treatment must be decided and instant. In a word, let me say, do not be afraid of the knife. You have no occasion for a catheter ; the urine has found its way into the cellular tissue, and you must let it out as freely as possible. On each side of the perineum and scrotum make a deep incision. You need not limit the incision to two or even three inches in length, because you are really cutting into urine, and very little, comparatively, into tissue. The structure is so enormously distended that there is but little tissue to divide ; and although the incision may appear very deep and long, when the urine has drained away, the wound will be comparatively small. The incisions generally bleed rather freely at first, and from three or four a patient may soon lose half a pint, or even a pint of blood. The urine runs out also, and as the distension goes off the vessels contract ; but if you see any little vessel spouting, tie it at once. An incision should be made on each side of the penis, because there is not sufficient communication for an incision on the one side to relieve the other. Do not be extravagant in these incisions ; still it is better to err on the side of freedom than to use the knife inefficiently. The next day, if the case has done well, you will find the scrotum much reduced in size, and the parts altogether much less swollen and inflamed. There is now a direct communication through the cellular tissue from the bladder, by means of an opening from the urethra behind the stricture, and you will, as a rule, be safer without a catheter, permitting the urine to drain off freely by the artificial channels for a time.

What happens afterwards ? This : that in consequence

of the relief afforded, obstruction is much diminished. When the urine flows by another passage, the urethra begins to improve, and in three or four days you will probably have no difficulty in passing a No. 3 or 4 catheter. Patients even with very considerable extravasation, prostrated as they are when you see them, if promptly treated by the knife, and well supplied with nutriment and stimulant, if necessary, often make striking and rapid recoveries. The whole scrotum may slough away, and the testicles may be seen uncovered in the wound, which nevertheless becomes well and soundly healed.

At this stage we are naturally led to consider the next subject.

After the exit of the urine has continued for some time through the artificial sinuses thus produced, some of them may fail to heal, although this is quite an exceptional circumstance; but if they do remain patent, the channels thus left are termed 'Urinary fistulæ.' I may remind you that this day week there were in my ward three patients illustrating this condition, rather exceptionally obstinate cases. One was caused by extravasation of urine as just described, and the other two occurred by the more usual and common course, namely, as a result of stricture of the urethra.

I have said that extravasation causes fistula; how does stricture produce it? In some patients, when a stricture has long existed, and has had no treatment, chronic abscess often forms, say in the perineum, between the urethra and the surface: another mode, indeed, a mild one, by which nature attempts to give the urine an outlet. In process of time this opens externally, and a few days afterwards a little urine finds its way through it, and passes at each time of making water. If no relief is afforded to the patient, another abscess forms; and so several sinuses may arise, and other openings in various and surrounding parts, all giving exit to urine. These fistulæ may take place in a great number of situations, such as in the penis, in the scrotum, in the perineum, in the groin, and in the rectum; but the two latter situations are very rare.

We will consider the first three separately, because the fistulæ which open into the rectum require a different treatment altogether. Then, respecting their specific characters, I

shall make three classes, examples of which may be found in any of the localities named.

First: *Fistulæ* may consist of simple openings or channels leading in a direct line, or nearly so, through the tissues which intervene between the urethra and the external surface.

Secondly, these channels may be surrounded by indurated deposit, the result of inflammatory action, and they may be more or less circuitous in their course, two complications which hinder the process of healing.

Lastly, these channels may be enlarged in breadth or depth by loss of substance from sloughing, so that even a portion of the urethra itself may have been destroyed; and these are the most difficult cases to deal with. Hence these *fistulæ* classify themselves naturally as simple *fistulæ*, complicated *fistulæ*, and *fistulæ* with loss of substance.

I. I will deal briefly with the 'simple urinary fistula.' By this I mean a single passage, mostly following chronic abscess in the perineum, through which a small quantity of urine trickles at each act of micturition. A small opening is seen in the skin, with a little red granulation or two at its margin; no pain is generally referred to; the annoyance of the wetting of clothes and its results form the chief source of the patient's complaint.

Now this condition is, in nineteen cases out of twenty, occasioned by an undilated stricture of the urethra. And I desire you to remember that in this considerable proportion of patients so affected, you may be sure that the fistula will heal if you dilate the urethra with care to its normal calibre, or nearly so. Let me observe to you that patients, those met with in private practice especially, are often extremely anxious about the result of an opening in the perineum or elsewhere through which any urine passes; and it is right that you should assure them that if the stricture is thoroughly dilated the unnatural passage will almost certainly become healed. But there is an important point to be considered in connection with this subject—viz. the quantity of urine passed by the fistula, compared with the quantity passed by the natural passage. Of course the gravity of the affection depends very much on the relative proportions passed by the two ways. Usually the greater part of the urine passes

by the right way, and one-fourth or less by the wrong passage. If a large quantity—say three-fourths—passes by the unnatural opening, then probably a considerable degree of urethral obstruction is present. Nevertheless, you will probably see that in proportion as the stricture becomes dilated, the quantity of urine passing through the fistula gradually diminishes and finally ceases altogether, after which the sinus soundly heals; but this latter result is achieved only on the condition that the stricture has been thoroughly dilated.

II. We come to fistulæ which are complicated with much inflammation and induration in the perineum. These may be multiple, or may often be circuitous in their course, and in either case you may find five or six openings. I have seen a patient here with twice as many, so that instead of the urine being discharged by one stream, it flowed as from a watering-pot. Even this condition very much improves as the stricture is dilated, and may be recovered from with no other treatment; but this is not always the case. Then there are some instances looking less formidable, like those now in the ward, with perhaps only two or three fistulous openings, through which the greater part of the water has passed for a long while. You recollect that we fully dilated the stricture in each case; but still no improvement as regards the flow of urine through the fistulæ took place. A No. 12 catheter was passed; but the patients were by no means cured. The condition of the perineum improved very much; the induration, redness, and discharge diminished, but still more than one-half the urine obstinately held its erratic course through the perineal openings. Now, what is commonly done in such circumstances? Usually operative proceedings of some kind, such as laying open the sinuses with the knife, are resorted to; or, if these are postponed or have been rejected, a more tedious process has been employed. The principle of treatment laid down—and I have myself applied it successfully—is, that it is necessary that the external openings of the fistulæ should be very free, and to ensure this condition, by means of the knife, or more commonly by the application of potassa fusa, or by some other means, so that the urine may not be detained in its course from the urethra to the external surface, causing

fresh induration or thickening. When this has been done the internal surface of the fistula is stimulated or 'revived,' by introducing a heated wire, or a solution of cantharides or of nitrate of silver, or a probe armed with the latter. No doubt this treatment sometimes succeeds; but it is at best a tedious process.

Then it was formerly a frequent practice to attempt the cure of such fistulæ by tying-in a flexible catheter for a period of some weeks, or even of months, with a view of conveying the urine from the bladder to the surface so completely that none should come into contact with the urethra and fistulæ. But this plan, based on a theory at first sight apparently sound and efficient, generally failed in practice, and for the following reason. Observation shows that in these circumstances the urine sooner or later finds its way by the side of the catheter, along the urethra, and so into the fistulæ by the force of capillary attraction or otherwise; hence disappointment was almost invariably the result of this treatment. The practical surgeon soon discovers that tying-in a hollow instrument never ensures the transit of all the urine through it; some will always escape by the side and defeat his purpose. I have therefore completely discarded all efforts in this direction, and have adopted another principle and another method. For some time past I have insisted on teaching the patient to pass the catheter himself and use it for every act of micturition, whether by day or night; and this is by far the most rapid and the most certain method. With regard to the two cases upstairs already referred to, ten or fifteen years ago I should have applied potassa fusa or the galvanic cautery, or something of that kind; but the fistulæ have soundly healed, through ensuring, by using the catheter every time the urine is to be passed, that no portion of the current is permitted to pass through the fistulous passages. You will first teach the man to pass a No. 7 or 8 flexible catheter, the stricture having been dilated; and he agrees to pass it every time he requires relief, night and day. On no occasion is he to permit the urine to flow spontaneously—say, during five or six weeks—not even when he goes to stool; and this is avoided by always using the catheter immediately before his bowels are opened. That plan has been followed in each one of the three cases in

question without difficulty and with perfect success; for each man has a sound perineum, and has now relinquished the use of the instrument.

But when the openings are numerous and large, and there is great induration in the perineum, with much purulent discharge from sinuses or even cavities there—and when, in addition to this unhappy state of things, the stricture is an obstinate one, not readily amenable to dilatation—the operation of external urethrotomy upon a grooved staff previously passed into the bladder is probably the best remedy. Not only is the whole of the stricture divided, but the sinuses are laid open, and free drainage from the unhealthy tissues is ensured. Such a proceeding may be expected in most such cases to prepare the way for healthy action and repair which will end in producing an efficient urethral channel and sound closure of the sinuses.

III. We arrive at the third form of fistula, that in which there is loss of substance. This class must be dismissed rather briefly, because its full consideration would involve a tedious detail of many different surgical procedures. Where you have this loss of substance, a plastic operation of some kind is generally required to fill up the gap which exists. When the opening is small, you may contract it very materially by the heated wire or galvanic cautery, or by any mode which tends to produce a contraction of the tissues. You know that cicatrices which result from burns contract considerably, and you avail yourself of that action in this instance. Most commonly, however, if the soft parts have been largely destroyed, some plastic operation is required for the cure. Thus, on passing a silver catheter, when a portion of the urethra has sloughed away, you may see perhaps a quarter, or a third, or even half of an inch of the catheter exposed in the wound. The successful treatment of such cases demands much care and nice management. They do not often come under our notice, and less often are they completely cured.

I have had in the hospital three or four such cases, and in each the canal, by means of plastic operations, has been entirely restored. Some of you saw one last winter—a man who was the subject of a considerable open wound, situated just between the angle of the penis and the scrotum, and

showing at least a third of an inch of the catheter, the whole of the floor of the urethra having sloughed away. The operation in that case was extremely successful. The first operation completed it, with the exception of an opening not larger than a pin-hole. What was done was to pare the edges all round, then to raise from the scrotum below a flap of skin of ample size and thickness so as to maintain its vitality; and this was brought up to cover completely the wound, the margins being carefully attached by a number of little silk sutures. That fistula healed perfectly. And why did it heal? Here is the important point: there was one condition necessary, without which the proceeding would have failed. A week or two before performing this operation, I made the patient learn to pass the catheter habitually, so as to draw off every drop of urine; and finding him thoroughly expert, I performed the operation; and for a month he never allowed any urine to pass otherwise than by the catheter. Had I tied the catheter in, this result could not have been attained because the urine, as I have told you, always finds its way by the side sooner or later. Luckily, he was able to perform his part of the compact to the letter for the stated term, so there was no reason why a wound should not heal there as well as anywhere else. The little tiny opening which remained was subsequently closed by means of the heated wire, and the urethra can now perform all its functions perfectly well. You know there is another very important function connected with this canal besides that of micturition, and it may be very seriously affected by such an opening as that. I do not know how you might estimate the circumstance referred to, but it is one which may involve very important considerations in cases where the transmission of a great family name or title or estates depends on the effective performance of that function. In any instance, however, virile capability is to be restored whenever we have the power to do so, and in the case before us it was necessarily absent until the abnormal opening had been closed.

If I were to illustrate the subject of urethro-plastic surgery, a lecture or two would scarcely suffice to describe the different kinds of operations which are performed in different spots. I have taken the case described as a typical one. It

is one of the most difficult to close. The penis is liable to differences in form: the patient may be troubled with erections, which may damage any operation, and there is often very little flesh to furnish flaps. But in the perineum and scrotum the effect of erection has little influence, and materials for our purpose may generally be found.

A word or two about urinary fistula opening into the rectum. You remember that I made an exception in reference to fistula connecting the urethra with the rectum. There is a case upstairs in which it occurred from the patient himself thrusting a bougie from his urethra into the rectum. More commonly it occurs from prostatic abscess. In these cases, at each act of micturition, urine passes into the rectum—often a very troublesome, even distressing circumstance. The bowel becomes excoriated, and the patient is obliged very frequently to go to stool. I shall say very few words about it, because each case must be treated on its own merits. I will give you the result of my own experience, for I do not know that there are any published records respecting these particular cases. They are very few in number, but it is a very serious and mostly a very troublesome lesion when it does occur. I cured one case solely by the influence of position. It was the case of a young officer whom I saw in private practice (I have not met with a precisely similar one in the hospital, and must therefore refer to it), who passed three or four tablespoonfuls of urine into the bowels at each act of micturition, after having had some abscesses there which I did not see. It occurred to me, after some wholly inadequate treatment by other means, to tell him to lie down on his face and make water in that position, never allowing a drop of urine to pass in any other way. In a few weeks he was quite cured—very fortunately for him on such easy terms. If you ever meet with such a case the plan may be worth trying. I have had two other such cases since, but it has not succeeded. In the successful instance to which I refer, it occurred to me that the force of gravity would carry all the urine by the proper channel. None passed into the rectum, and at the end of six weeks the patient was well. I saw him some years afterwards, and he was soundly cured. But were I to meet with a similar case now, I should desire the patient to pass all his urine by the

catheter, and I have no doubt it would be successful. Unless there is a loss of substance, this method usually cures the patient; but if there is much loss of substance, and, worse still, if the opening is from the bladder into the rectum direct, it is necessary first to examine the fistula thoroughly as to size and situation. Put the patient on his back, as for lithotomy, and introduce into the rectum a duck-bill vaginal speculum, which you must have seen me do, so as to get a good light thrown upon the upper wall of the bowel. If the fistulous opening is sufficiently large to require a plastic operation, I should not hesitate to perform the same operation that is done for openings between the bladder and vagina—that is, to pare the edges, and stitch them together with silver or hard silk sutures—only it is more difficult, as there is less room in the rectum for manipulating than in the vagina. In the vagina there is plenty of space for the work; but I have done it in the male also, in two instances. I found it possible to do, though difficult; and I believe that is the best plan when these cases occur with loss of substance. If the opening, however, is very small, it may be greatly diminished in size, if not closed, by applications of the galvanic cautery, as I have repeatedly done.

Such a condition sometimes happens after the operation of lithotomy. A lad was here not long ago—many of you remember him—who had been cut for stone by the lateral method in the country some years before with success, except that the rectum had been opened; a fistula had existed ever since, and he was sent up for me to close it if possible. I placed him in the lithotomy position, under chloroform; emptied the bladder by a catheter; and with the vaginal speculum above mentioned we could all see an opening in the upper and left part of the bowel which admitted a No. 9 silver catheter. Having ready prepared a large double wire connected with a powerful battery, the wire was first shaped and placed within the fistulous canal, and then, the current being turned on, the sides were freely touched with the heated wire. This proceeding was repeated about once a week or ten days, the quantity of urine passed by rectum steadily diminishing. I never, however, could altogether close the track, although I reduced the rectal urine to a trifle, and so made the patient

comfortable. He no longer wetted the bed against his will at night—an occurrence which forms one of the most troublesome features in these unfortunate cases. Where, however, the opening is not so large as it was in this instance, and sometimes, indeed, when it has been larger, the proceeding has been followed by success. Ceaseless care and perseverance are mostly necessary, both to the surgeon and to the patient, in order to achieve a complete and lasting cure.

LECTURE XV.

ON CERTAIN NERVOUS AND FEBRILE PHENOMENA ASSOCIATED WITH
THE EMPLOYMENT OF INSTRUMENTS IN THE URETHRA AND
BLADDER. 'SHOCK.' 'URINARY FEVER.'

GENTLEMEN,—I have had occasion more than once to call your attention to the fact that the male urethra is formed by structures which are extremely delicate and very susceptible to injury from slight mechanical interference. Furthermore, it possesses extreme sensibility, and foreign substances brought into contact with it cause scarcely less suffering than they do when used for that proverbially sensitive organ the eye.

But there is another form of sensibility possessed by the urethra which is altogether absent in the eye; one which demands a greater degree of circumspection and gentleness when applying instruments to the urinary canal than when using them for the organ of vision.

Thus it is by no means an uncommon occurrence, when a bougie is passed through the urethra for a patient, especially if it be the first experience of that operation—the instrument may be soft and pliable, and be used with the greatest care so as to occasion no lesion whatever—that he turns pale and faint, and if he is in the upright position, his limbs give way and he falls insensible to the floor. He may recover in a few seconds, and generally does so; or he may be slightly convulsed and not regain consciousness for three or four minutes. On recovering he barely comprehends what has taken place, but is soon able to tell you that it was not pain, for he recollects none to speak of, that caused the temporary loss of consciousness. As a matter of fact, it was occasioned by the mere contact of the instrument with this sensitive passage, united to nerve-centres as it is by most direct and intimate relations, witness the occurrence of erection as the result of a merely

passing thought ; for you must call to mind that the penis is essentially a sexual organ, and is only secondarily a urinary one. Hence the amount and the excitability of its nerve supply ; and the facility by which a momentary but severe impression is produced on the nervous system appropriately designated by the term 'shock.' The resulting phenomena are, partial arrest of the heart's action, occasioning a corresponding failure in the brain circulation, producing unconsciousness for a limited portion of time, while nerve-supply to the whole body is of course impaired to a greater or less degree.

Then there is another kind of attack, far less common—indeed it is rare as compared with the preceding, or with those febrile phenomena which we shall have subsequently to consider. After an operation which has involved the male urethra, any procedure, indeed, which does violence to its tissues, a smart but transient shiver may occur almost immediately or within a few minutes after. But there is no elevation of pulse or of temperature, and no other phenomena succeed the shiver. When it has ceased, the patient is in no way worse than before, and it is obvious that no important disturbance has taken place. It probably indicates a temporary defect of nerve-supply, and seems to have no other significance, and to occur only in certain unusually mobile and sensitive constitutions. Such an occurrence has been sometimes described in clinical histories as 'a false rigor.'

But there is another and happily far rarer form in which 'shock' of the gravest kind may be said to follow the use of an instrument. Twice in my life it has fallen to my lot to see a patient, apparently in fair health, in whom death occurred within twenty-four or forty-eight hours after the use of a catheter, passed without difficulty and occasioning no visible lesion, as the autopsies proved. The first was a case of stricture, during my house-surgeoncy here, in Ward 2, in which a No. 8 catheter was introduced by the visiting surgeon, in place of a No. 7 which was the largest the patient had previously been accustomed to as the extreme limit of size for some years ; and the fatal event took place in twenty-four hours. The second case occurred in my own practice : the patient was an elderly man for whom I passed a small

catheter through a narrow stricture, for the first time for several years, with some difficulty and rather prolonged manipulation. There was no bleeding, however, or other sign of mischief, and the urine was withdrawn by the catheter, after which it was removed. Suppression of urine followed, and death in forty-eight hours, the autopsy revealing nothing but highly congested kidneys. In the latter case the renal function seemed to be suddenly suspended, not through the intermediate appearance of inflammatory action, for the development of which there was not sufficient time, but by some arrest of nerve-supply following instantly on the use of an instrument employed without producing any obvious structural lesion.

Excluding then these typical forms of accident, due to nervous disturbance, we will go on to consider other phenomena, namely, those which are the manifestations of what may be regarded as febrile action.

I shall employ the term 'urinary fever,' as the most suitable to denote the common forms which every hospital student may soon become familiar with after some experience in the surgical wards. It has been called 'urethral fever,' a term to which objection may be rightly taken, and by some has been referred to as 'catheter fever,' a phrase to which I shall refer hereafter. I will describe for you a typical case.

The visiting surgeon, in making his round through a male surgical ward, approaches a bed containing a newly-admitted patient, and is informed by the house-surgeon that a case purporting to be one of stricture of the urethra has been sent in, and that it has not been examined. After a few questions, the surgeon selects a bougie of full medium size and, passing it, finds an obstruction about five inches distant from the external meatus. Exchanging it for a No. 4 flexible catheter, this is passed through the stricture with some degree of pressure, and onwards into the bladder, removing a few ounces of urine without any sign of blood, or, it may be, with some faint trace. No particular difficulty has been encountered, and the first step of the dilating process is duly recorded. Some three or four hours afterwards the patient wants to pass water, and feels, in doing so, a smarting sensation, which, after all, is the natural consequence of pass-

ing any instrument through the urethra, whether healthy or diseased. Soon after, it may be a few minutes, or an hour, or even more, the patient suddenly feels a cold chill through his back, thence invading the whole system, so that his teeth chatter involuntarily and all his limbs tremble so much that it is obvious to a bystander that he is the subject of a convulsive shudder, which he cannot control, affecting the voluntary muscles. The patient's look is haggard, he becomes greyish in tint, dark beneath the eyes, the expression of the face is altered, his breathing is hurried, and the voice changed. The attack varies greatly in intensity in different cases and circumstances. Such a patient is, of course, sent to bed at once, if not already occupying one, that hot bottles and warm coverings may be applied; and the bed itself shakes with the rigor if the fit is severe. He now begins to complain of severe pains in his head, back, and limbs; there may be an attack of vomiting or of purging, although these are not so common. The temperature, if taken now, is high, and, rising rapidly, reaches nearly 104° , or passes it, sometimes to 105° . In half an hour, perhaps, more commonly an hour or more, the pale and contracted features become red, then flushed; the mouth is dry; he asks for drink, and, with an oppressive sense of heat, he is eager to throw off the coverings which have been heaped upon him. His pains are now severe and his temperature at its maximum; the pulse is rapid, hard, and vibrating. Then gradually appears a little glistening on the dry cutaneous surface, the commencing dew of gentle perspiration, which quickly becomes profuse from the now soft, relaxed, and reddened skin, with sensible relief to pain and feverish heat. The respiration becomes slower and fuller, and the patient is tranquil, passive, exhausted in appearance, as he lies on his back sweating at every pore. Then the pulse slowly grows less rapid, is soft and full, temperature diminishes, thirst continues, and he passes a little urine, dark in tint. After six, twelve, or eighteen hours, the signs of fever disappear, leaving him more or less weak, and he is convalescent the next day or the following one.

I offer you this as a sketch of what may be called a smart attack of acute urinary fever in its transient form. Such an occurrence excites no suspicion as to the presence of renal, or

of any other serious disease. In estimating the nature of the disturbance, it is not unreasonable to believe that a very minute quantity of urine has been introduced into the circulation through some abrasion of the urethral mucous membrane, made by the instrument, so slight as to produce no hæmorrhage; and that the absorbed matter, which it is not absolutely necessary to suppose contained septic poison of a dangerous kind, sufficed to occasion the symptoms characterising the process by which it was eliminated. The patient after his recovery has no return of the attack; and instrumental treatment being subsequently employed, of course, with every precaution and extreme gentleness, he still remains free, and has no further attack.

But there are other cases in which, although the instrument has not been again employed, the febrile attack reappears in three or four days, apparently without provocation, and this may be repeated again and again. We may term the condition thus described—provisionally, so to speak, and as a mere clinical designation—‘Acute Recurring Urinary Fever’; for the cause is often obscure and will, indeed, be found to vary in different individuals. And sometimes the reason for the recurrence is not very obvious; thus, if no cystitis appears, or if a pre-existing slight attack is not intensified, suspicion may arise as to the presence of inflammation in the ureter and pelvis of the kidney of either side, to be sought by examination for local tenderness, &c. And when there is no such affection, and no renal implication or other cause—septicæmic infection, for example—discoverable, the recurring attacks will probably soon diminish and disappear. Generally speaking, in subjects of young or middle age they do so, and such patients even after prolonged attacks may soundly recover. Such results are by no means infrequently met with by all who have much to do with stricture and cystitis. A very notable instance of this is afforded by the case of a man who, having stricture of the urethra, not necessarily very narrow, is liable to be the subject of a series of febrile paroxysms, even after a single application of the dilating instrument, and which may continue during a period of two or three weeks. Complete division of the stricture is then made by internal urethrotomy; no shiver follows the

operation, and he never experiences another. Such cases are by no means infrequent.

On the other hand, a recurring attack or two, of a mild kind, sometimes indicate the development of cystitis and increased muco-purulent deposit in the urine, arising within a few days after the use of an instrument which has occasioned the introduction of septic matter into the bladder. The urine is then always cloudy, has an unpleasant odour, and is loaded with bacteria. But this merely local condition of the urine often occurs, and most commonly does so without exciting any febrile symptoms. When slight shivering attacks accompany it, there may be reason for suspecting that some septic poison may have insidiously found its way into the blood.

Septicæmia, in various degrees of intensity, then, is liable to be met with, either with or without any instrumental treatment, and is not to be confounded with 'urinary fever' as described above. And I think we shall do well to limit the application of the latter term to those conditions which are not manifestly septicæmic, and certainly to employ the latter when they distinctly are so. A more formidable disturbance of the constitution arises when septic poison formed in the bladder from decomposed urine and from injured and disintegrating tissue there, or in the prostate, is conveyed into the circulation. Blood poisoning may follow, even then of a mild type, continuing for a considerable time, associated with attacks of slight rigors, and issue in complete recovery. But it may appear and follow a course of greater rapidity and intensity, prostrating the patient, whose resisting power is often feeble. The accompanying fever in such circumstances is that commonly described as of a low type, marked by debility, steady decline of all the powers of life, and often associated with crimson staining of the urine from capillary exudation or hæmorrhage.

Lastly, the recurrence of rigors may turn out to be the precursory symptom of purulent deposit in the joints and muscles, or in the great cavities, familiar to us as pyæmia; and occurring sometimes, but, on the whole rarely, in connection with disease and operations affecting the urinary organs.

We now come to that form of urinary fever which occurs in elderly men, and is chiefly, if not altogether, associated with those who are the subjects of confirmed atony of the bladder, mostly depending on prostatic enlargement producing obstruction to the outflow of the urine.

It is not necessary to do more than recall in the briefest terms that the common result of such obstruction is the retention of a constant quantity of urine in the bladder, after the patient has voided all he can by the natural efforts. The retained portion is spoken of as 'residual urine,' and this varies greatly in quantity according to the length of time the defect may have existed before its discovery. It may be first found when not exceeding one or two ounces, or not until it amounts to thirty, forty, or upwards. In the great majority of cases, those for example in which the residual urine does not exceed twelve or fifteen ounces, it is rare to find symptoms which excite any anxiety. When the quantity amounts to fifteen or twenty, there is always occasion for watchful care; when it reaches twenty, thirty, or more, the condition demands serious attention and rigid observance on the part of the patient, when he commences the use of the catheter, of instructions laid down and already detailed in Lecture XI.

When the residual urine has become a very considerable quantity before the fact is discovered, and catheterism is then commenced, the patient may after a few days show signs of weakness, lose appetite, complain of thirst and of feeling chilly, but he is by no means invariably the subject of rigor. The tongue becomes dry and the urine cloudy, the temperature varying between slight elevation and some depression below the normal standard. In fact, a feverish condition, so-called, of the system is established, which is generally the result of serious structural change in some part of the urinary organs and may lead to a fatal issue. It is said on the high authority of Sir A. Clark, that these phenomena have been known to occur, although very rarely, in the absence of any such serious organic changes of the ureter and kidney. In the great majority of cases, however, it is certain that they are present. The phenomena enumerated have been regarded as 'fever,' and have been so described, again let me say, chiefly for the purpose of clinical designa-

tion, and usually as 'fever' of a 'low,' continuous, or chronic type.

The lesions underlying the symptoms described, however, vary in different cases. In many instances there has been dilatation of the ureter and pelvis of the kidney, with damage to its structure impairing its important function. Hence probably the deficient excretion of urea which characterises some of these patients, a condition of extreme importance in relation to their ability to recover from surgical interference of any kind ; and well expressed long ago by Sir A. Clark, when insisting with emphasis on its importance, by the term 'inadequacy of the renal function.'

If difficulty arise with the use of the catheter, or the bladder be entirely emptied at first, more or less cystitis usually follows, naturally accompanied by some symptoms of fever. These increase, and the urine becomes highly charged with pus and mucus in proportion to the degree of cystitis, and the extension of inflammation to the pelvis, and to the kidney itself. If the latter has already suffered structural change, the result must almost inevitably be fatal ; and it may be so by blood-poisoning through purulent deposits in the renal structure, the event occurring by absorption from these ; or by deficient elimination of urine elements, or more rapidly by suppression of urine, a somewhat rare termination to these cases. The patient may struggle against his fate for a longer period if the condition described affect one organ only ; he possesses therefore a faint chance of recovery if he has a fairly healthy organ on one side and blood-poisoning does not arise from the other. Such is a brief sketch of the pathological history of long-standing and neglected atony of the bladder with distension, compelling surgical interference at a late period, and it shows how impossible it is to employ, except as an imperfect but convenient term, the word 'fever' as applicable to the patient's symptoms. It is this form to which the term 'catheter fever' has been sometimes applied.

• The term may be an undesirable one if it tends to perpetuate a popular but erroneous belief, which has cost many valuable lives, that the catheter has been the cause of death and not the disease for which it was the necessary and the only treatment which could afford a chance of life. And when unsuc-

cessful, solely because it has been adopted at too late a period in the history of the case, the impression is still cherished by friends of the deceased, that had no catheter been used the patient might have survived, and that, in fact, he only began to flag when 'that fatal instrument' was first applied. We know, too well, that no fever, much less any danger to life, would have arisen in connection with the case had the use of the catheter been adopted at an earlier stage. It is hard, indeed, then, for the surgeon—still more so, regarding the interests of future individuals similarly affected—that the patient should have been supposed to die of a malady the name of which, 'catheter fever,' by implication brands the one essential remedy as the cause of the fatal malady.

Respecting treatment of this condition, I have nothing to add except that which I have, and with some emphasis, already said, in connection with the subject of employing the catheter and general management associated therewith, for patients with advanced atony at the end of the lecture just referred to.

For the transient attack, the less the resort to medicine the better. I strongly object to the popular remedy of hot spirits and water in the cold stage. It is far better to cover the patient with warm blankets, apply hot bottles, and give a large cup of hot tea or other simple hot fluid the patient may prefer.

The dry stage of heat is soon spontaneously relieved by sweating, and the administration of diaphoretics &c. is superfluous. I have not the smallest faith in the power of quinine to prevent, postpone, or modify, an attack of acute or chronic urinary fever. There is not the slightest analogy between an intermittent of malarious origin and a paroxysm of urinary fever, and not the least reason for supposing that quinine, as a specific for the former, should therefore be a remedy for the latter. There is more ground for supposing that aconite checks the violence of febrile action in the stage of excitement. And with some persons, by no means with all, morphia soothes and mitigates the most painful sensations they have to encounter.

Good nursing, equable temperature, a supply of simple food when the stomach can bear it, attention to the bowels and action of the skin, and, subsequently, the exercise of care

in avoiding exposure to external cold as the patient returns to some activity of ordinary life, form the most important elements of the therapeutic scheme.

Let me sum up in a few words the substance of our rapid survey of the varied occurrences of a morbid character liable to follow the use of the catheter, and often loosely spoken of as 'urinary fever.'

We have, first, 'Shock;' a temporary derangement of nervous function, in its very common and harmless form, occasioned by merely passing an instrument into the male urethra; also sometimes following any operation there. Besides this, there is that grave 'shock,' similarly excited in patients with pre-existing disease in some part of the urinary organs, which has been known to be rapidly followed by death: an event however of the extremest rarity.

Then we have, secondly, after an instrument, or following an operation on the male urethra, very rarely in the female, a Febrile attack manifested in three stages: chill, dry heat and sweating; exceedingly common, and as a rule speedily ending in convalescence. In exceptional instances it recurs, with or without evidence of persisting local inflammation in some part of the urinary organs.

Then we often meet with Simple septicæmic infection of the bladder through the introduction of bacteria by instruments, purely local, occasioning slight cystitis, and mostly unaccompanied by any febrile symptoms.

More important is the fact that a Constitutional septicæmia of a mild type may be occasioned by absorption from unhealthy action in any part of the urinary tract, sometimes lasting a considerable period, and accompanied by frequent slight febrile attacks. Purulent absorption (Pyæmia) may be ushered in by symptoms analogous to those of urinary fever; but its characteristic action is soon manifested by local signs and symptoms, mostly of the gravest kind, and too well known to require further description or illustration here.

Lastly: when a bladder which has long been atonied and distended with urine is necessarily, as in a crisis of retention, emptied by the catheter, the use of which then becomes essential to the patient's existence, inflammation of it may arise from want of adequate precautions, and sometimes in

spite of them. This condition may, if the renal organs are sound, or but very little damaged, issue in recovery. If, on the other hand, the inflammation spreads to the ureter and pelvis, or to the kidney, these being already enfeebled or diseased, a fatal termination usually arrives, by a pernicious septicæmia, in two or three weeks; but sometimes occurs more rapidly by chronic uræmia, or by total suppression of urine.

LECTURE XVI.

GENERAL OBSERVATIONS ON THE NATURE OF STONE IN THE
BLADDER, AND OF ITS SYMPTOMS AND DIAGNOSIS.

GENTLEMEN,—It will be my object to give you to-day a sketch in outline, embracing the chief facts relating to stone in the bladder, as well as some directions as to the best mode of recognising its presence there.

And in the first place I think it will be desirable to state briefly, what are the sources and nature of the bodies which are included in the term ‘calculus or stone in the bladder,’ the two terms being absolutely synonymous.

You are probably aware that several products of different organs are ranged within the scope of this somewhat popular expression. In few words let it be said, that a large proportion of urinary calculi are of renal origin, and consist solely, or almost solely, of—

(a) The natural saline constituents of the urine. Others consist of—

(b) Certain elements often, but not necessarily, found in healthy urine and, like the preceding, separated from the blood by the action of the kidneys; while a few others are formed of—

(c) Elements which are foreign to the urine altogether, being excreted by renal action in certain morbid states of the body.

Of the first-named kind, all deposits of uric acid and some of phosphoric acid salts are examples. Of the second kind, a salt of oxalic acid is the type. And of the third kind, cystine may be named as the chief illustration.

But it is an interesting fact, which I will remind you of here, that many animals habitually pass the renal excretion in the form of ‘stone,’ for example the serpent tribe in all its

varieties, whose renal excretion is almost solid pure uric acid. Birds also pass their urine salts undissolved, and consequently require no urinary bladder. Man and the higher animals excrete them as a rule in solution; nevertheless these salts are sometimes deposited in a solid form, usually as small crystalline particles, and then the term 'sand' is commonly employed to denote them. Sometimes they issue in the shape of little hard bodies of the size of a hemp seed, or a pea, and when they are of this size, or a little bigger, they are spoken of as 'gravel' or 'concretions,' the latter word denoting generally examples of the largest size. And when they are much too large to pass by the natural outlet, the urethra, the term 'stone' is appropriately applied.

But some stones are formed independently of any action of the kidney, and, although of vesical origin, can scarcely be described with absolute accuracy as altogether urinary deposits. A large amount of earthy phosphate has its origin in the secretion of the bladder itself, associated with other elements, chiefly ammonia, evolved from the unhealthy urine therein. And thus stones of all sizes, as well as sand, gravel, or concretions, are produced solely in the bladder. Lastly: a stone is often formed by a combination of different deposits, so that any calculus originating in the kidney (cystine being mostly excepted), and arriving, however small, at the bladder, may enlarge there by accretion of phosphates furnished in the manner just noted, and thus become an example of 'mixed' calculus.

Next, I think it desirable to propose some rule, only partially possible, in order to define the kind of body to which the term 'stone in the bladder' is fairly applicable in adult cases.

We shall all probably agree that, regarding the male subject alone, the term 'stone' should never be applied to any solid formation which can be washed out entire or expelled through the urethra by the natural efforts; nor to any that can be withdrawn through it by dilating the passage, or incising it when once the foreign body has lodged therein. On the other hand, for female subjects in whom the urethra is short and dilatable, bodies of considerable size and density, and therefore fully entitled to rank as 'stone,' can be so withdrawn.

And I trust you will agree with me that the term 'stone' should only be applied to a calculous body which, being certainly too large to traverse the male urethra, requires to be crushed in the bladder, or that an incision in the soft parts should be made in order to effect its removal from that cavity.

Further, let me remark that, in every record of a stone removed by operation, the weight in grains or ounces, to be taken about three days afterwards, should be invariably stated in all reports. Uniformity of rule for our procedure in these matters is very desirable. Referring to my own experience, I may say that I have never admitted any calculous product weighing less than twenty grains to rank as a stone; and have never recorded its removal, however effected, as an operation for stone, but on the contrary as an operation for gravel or concretion. I think it right to say this because several cases in which small portions of gravel weighing only two or three grains were removed—not necessarily even crushed by a lithotrite, but merely washed out by an aspirator—have been published as examples of the 'operation for stone' in the adult, and incorporated in a statistical table as such. I am compelled to observe that if such insignificant products are to be so regarded, the meaning of the term 'stone' will be so changed that comparison in regard of results of treatment &c. with the records of the past or between the experience of different operators, must become impossible. Little things like these are mostly passed spontaneously; and much larger sometimes, as I shall show you presently.



FIG. 47.—*a*, A concretion weighing 2 grains; *b*, 3 grains; *c*, $5\frac{1}{2}$ grains (flat); *d*, $7\frac{1}{2}$ grains (cylindrical). The outline presents to the eye an idea of magnitude exceeding that conveyed by the body itself, as any one may observe by placing one within the outlines given.

Let us next inquire what classes of the community are most commonly affected by the complaint.

When I was a student here, nearly forty years ago, it was invariably said that stone occurred far more commonly among children than among adults. There appeared to be no difference of opinion on this question; in fact it was at that time an

axiom universally admitted. But later researches furnish good grounds for calling in question its accuracy. A very extensive experience of elderly patients has convinced me that the last third of life, and not the first, is a period eminently favourable to the production of stone in all its varieties, while during the middle term of life, as has always been agreed, stone is comparatively rare. I ventured to make this statement formally and publicly some twenty years ago, and it has never been contravened. And how was it, let me ask, that the old estimate has become reversed? For this reason, because almost all recorded experience of the malady up to a recent period was derived from hospital practice—a statement which involves by implication another fact, namely, that calculous disease had at that time been observed and recorded, on a large scale, only among the poorest classes of the community.

The strata of society which lie above these had never before been half explored. Elderly men among the well-to-do classes, with not very severe urinary symptoms—and the effects of calculus among such are usually far less severe than in young subjects—were generally believed to owe them chiefly to enlarged prostate, which was commonly and loosely believed to affect most if not all men, more or less, at about sixty years of age and upwards. Or, if this fact were not apparent, or actually demonstrable, then an elderly man with these symptoms was said to be subject to ‘strangury,’ so common in advanced life, or to have a ‘fit of strangury’; a vague and unmeaning term, and on this ground serving to hide a lack of knowledge or research, as such terms do, when diagnosis is uncertain or at fault. And the impression thus obtained often sufficed no doubt to save its victim from the pain and the trouble of diagnostic research; but it deprived him at the same time of all chance of salvation,—by the knife, which at the time I refer to was the chief method of obtaining delivery from the final sufferings and a fatal issue; although the operation itself often involved risks of no small magnitude.

Furthermore, I was so confident that a large proportion of the calculous cases found among the well-to-do classes in this country had thus been entirely overlooked, that I ventured—it is now about fifteen years ago—to make the following statement touching that fact here in this theatre. I said: ‘Gentle-

men, my belief is that far more than half of the cases of calculus among elderly men are not even suspected to exist, and the unfortunate result of this fact is that the undertaker is the real operator for this great majority.' Well, this was perhaps a—let me say—picturesque way of expressing a very strong opinion : my object being to impress you with the necessity of putting an end to this most unsatisfactory, not to say discreditable state of matters as speedily as possible.

In further illustration of this subject, let us briefly consider the conditions, in relation to the age of the patient, which are met with among those classes of the community which have been treated by operation at public hospitals in this country.

Shortly before the year 1860, I made a laborious inquiry among the hospitals of London and the provinces, availing myself exclusively of written official records sent to me from each, guaranteed as accurate by many obliging correspondents, including, among those of the provinces, most of the leading surgeons there. I then obtained 1827 cases of male patients operated on by lateral lithotomy, prior to the introduction of lithotritry into hospital practice, my primary object being to obtain the results of that operation pure and simple before these were interfered with by the selection of the most promising patients for lithotritry. In every instance in which the records had been imperfectly kept, I declined to use the reports. The consequence was that I obtained a completely trustworthy series of cases representative of hospital experience in this country during the former half of the present century.

Now mark the proportion of patients at different ages, which I shall set down on the black-board before you.

Hospital male patients of all ages operated on for the stone, chiefly during the first half of present century—total number, 1827.

Between 1 and 16 years inclusive.	From 17 to 50.	From 50 to 70.	Above 70.
1028	352	409	38

More than one half the number, you see, occurred before the age of puberty; about 22 per cent. between 50 and 70; and not more than 2 per cent. above 70 years of age. But before I compare this series with the experience of the present time, it will be interesting to observe to what cases lithotomy

was applied during the preceding century. And here you may especially remark with what rarity the malady was discovered among elderly men by our great ancestors renowned in the annals of history for their surgical acquaintance with the subject before us.

Take Cheselden as a conspicuous example of experience, of devotion, of enterprise, and, rarer still in those days, of taking pains to record the facts which he was personally concerned with. What were the figures which he published at the close of his career, embodying his practice in lithotomy at St. Thomas's Hospital? He relates that he 'publicly cut 213 patients at the following ages'¹ :—

	Under 10 years.	10 to 20.	20 to 50.	50 to 70	Above 70.	
Patients . . .	105	62	32	12	2	Total, 213

Much more than half his cases must have been below puberty; only $5\frac{1}{2}$ per cent. between 50 and 70; and only a bare 1 per cent. over 70.

After this, the next extended and trustworthy report is that of Mr. Robert Smith, of Bristol, who with great labour collected the provincial records of this country relating to stone operations, from which I transfer here two of the chief examples. He was surgeon to the Bristol Hospital, one of the oldest and best known in England during the eighteenth century. From the memorials furnished by its case books is constructed the following table of 347 cases, occurring between 1740 and 1820.²

	Under 16 years.	16 to 50.	50 to 70.	Above 70.	
Patients . . .	170	129	46	2	Total, 347

He obtained the following table from the Leeds Infirmary, another distinguished early school of surgery, furnishing 196 cases, between 1787 and 1817.

	Under 16 years.	16 to 50.	50 to 70.	Above 70.	
Patients .	83	81	30	2	Total, 196

Regarding the Bristol and Leeds cases together, nearly half were below puberty; nearly 15 per cent. were between 50 and 70; and less than 1 per cent. over 70.

He adds the Norwich School; but as that report was

¹ *Anatomy of the Human Body.* By Thomas Cheselden, F.R.S. 5th edit., London, 1740.

² *Trans. of the Royal Med. and Chirurg. Soc.,* vol. xi.

carried on and very elaborately produced by Crosse of Norwich to a later period in his well-known work, I will give the result direct from that source. The record commenced about the year 1770, and was continued up to 1833. It furnished 669 cases, and is as follows:—

	Under 16 years.	16 to 50.	50 to 70.	Above 70.	
Patients . . .	344	158	159	8	Total, 669

The Norwich cases up to a much later date are included in my own series of 1827 cases referred to before. So the sum of all these lists is as follows:—

The Cheselden series, 213; Robert Smith's cases from Bristol and Leeds, 543; the series collected by myself (including the Norwich cases) 1827; total, 2583. Of these, 1281 occurred before puberty, or almost exactly half the entire number; while the cases over 50 years of age amount to only a little over 20 per cent. of the total.

The patients above 70 years, in that vast collection, amount to only $1\frac{3}{4}$ per cent.

I will now set forth, by way of comparison with the foregoing series, the particulars of my own personal experience of calculous cases at all ages up to the end of 1886, which I have carefully collated expressly for our purpose to-day.

It amounts to 911 operations on patients of all kinds for the removal of stone in the bladder. All the calculi, with at most three or four exceptions, are in my possession; and I have in my case books a history of every patient, carefully made at the time, and containing all important details. There is also a catalogue of them, lying there for your inspection, containing the leading particulars of every case, and in almost every one also the name of the patient's medical attendant who saw the case with me.

Among them were 13 cases in the adult female; subtracting these, there remain 898 cases in the male.

I shall commence with that part of the collection which was treated in the hospital here, and they happen to be exactly 100 in number; namely, the male adult cases of lithotrity, 63; of lithotomy, 24; children and youths, cases of lithotrity, 4; of lithotomy, 9—total, 100.

This hospital practice, which I was compelled to relinquish in 1873 owing to the pressure of other professional engage-

ments, being deducted, leaves 798 cases in private practice, almost all of which have occurred among patients in the middle and upper classes of society: namely, the male adult cases of lithotrity, 693; of lithotomy, 102; children and youths, cases of lithotomy, 3: total, 798.

I place the numbers before you belonging to the two classes of cases, tabulated in groups according to age, on the plan adopted for the other collections.

	Under 16 years.	16 to 50.	50 to 70.	Above 70.	
Hospital Patients .	13	27	56	4	Total, 100
Private Patients .	3	93	527	175	Total, 798

And the first very remarkable contrast with the result of the former inquiry, which you will note, appears at the outset. Instead of finding one half the patients below 15 years of age with only a small proportion of elderly adults, I have myself operated on only three children, including all below puberty, during my entire experience of private practice.

I remember hearing Sir William Fergusson say, by way of illustrating a like experience with children's cases, that he had but once in his life received a fee for operating on a child; in other words, that all but one of his cases below puberty had occurred among the poor. But a similar observation was made long ago, in that most admirable treatise on the stone, by Deschamps, in the end of the last century, who says, 'Enfin, depuis de trente ans que je traite des pierreux, je n'ai pas encore vu l'enfant d'un riche attaqué de la pierre' (1796). You naturally exclaim, How is this to be accounted for? For the present let me defer any attempt to answer that question, but merely call attention to the very curious fact.

Observe next, I desire you, the number of elderly men, so curiously large among private patients by comparison with the hospital series, where they are comparatively few. You will note that they form the bulk of the large group we are now considering. We have already seen that the number of children is beneath notice; but the patients between 50 and 70, instead of forming 20 per cent., are now no less than 65 per cent.; and the patients over 70 years, instead of forming an unimportant 1 or 2 per cent., are now no less than 22 per cent. of the total. This is a very important fact, and one which very few persons would receive without absolute demonstration.

I have thus contrasted for you the relations which calculous disease bears to the two different sections of the population referred to. It is rare among working men of all kinds, agricultural labourers, and town-bred mechanics, especially the latter, throughout this country; it is, on the other hand, common among their young male children. It is more common still among elderly men, in easy circumstances, who are mostly overfed, and take insufficient exercise; but among their well-nourished and carefully-tended progeny it is almost unknown.

We may certainly then announce the general accuracy of the three following and very significant deductions from the facts before us.

Insufficient food, clothing, and fresh air, the necessary accompaniments of poverty, appear to encourage calculous formations among children, but not among adults.

Habits of self-indulgence, in relation chiefly to diet and indolence, encourage calculous formation in elderly adult males; but the children of such parents are not so affected.

Hard physical labour and a regimen which necessarily contains simple diet, largely cereal, with animal food in small proportion, even although often associated with intemperate habits, and with unhealthy dwellings, discourage calculous formation among all classes of the community alike.

We pass on to notice the varieties of renal and vesical calculus which are not numerous, and a few details suffice to describe them. I shall regard three chief classes as the most important to consider in relation to the practical management and the removal of stone in the bladder. That which is most frequently met with there is formed of uric acid and its combinations; the second is that in which phosphoric acid is combined with volatile alkali and the alkaline earths; and lastly, there is oxalate of lime. For all practical purposes those are the three great divisions. Uric acid and the urates form the largest of these, many specimens, however, having a slight admixture of phosphate. The next is the phosphates, many having no other element visible to the eye; and a very small division is formed by the oxalate of lime. But there is a considerable class of calculi which contain notable proportions of urates, or of oxalates together with phosphates, so that they

cannot be fairly classified under any of these heads. Such are denoted by the term 'mixed calculi.'

My own series of cases, upwards of 900 in number, including both private and hospital, already referred to, which have been carefully examined, yield the following result:—

Uric acid and the urates	58 per cent.
Phosphates	21 „
Oxalates	3 „
'Mixed' calculi	18 „

The rare varieties are cystine and pure phosphate of lime; of which three of the former and one of the latter have fallen to my lot; a number insufficient to furnish a percentage.

Next let us briefly consider the early history of calculous formation. You know, of course, that the appearance of a stone, however small, in the bladder is by no means necessarily the first stage of the malady. But it may be so sometimes. There are indeed two distinct sites in which stone may begin to be formed. The first and chief is the kidney, which separates the constituents, either uric acid or oxalic acid, from the blood. The second, as just intimated, is the bladder itself, and in either case the material appears first as a minute crystalline deposit. Take uric acid as the most common form; it often first appears as a persisting deposit of urates (in excess); or in the characteristic 'brickdust' or cayenne-pepper-like excretion so familiarly known as 'red-sand;' or it may occur in the shape of rounded masses of uric acid, and be thus discharged from the kidney, like shot of various sizes or small peas; while some are passed which are even larger still; and these bodies are popularly referred to as 'gravel.'

An acid calculus, then, is always formed within the kidney; and occasionally but rarely remains there, becoming 'renal calculus,' the occasion of great misery; a condition for which surgical treatment, until of late years, has rendered very little service. Now, however, the operations of nephrotomy and nephrectomy enable us to afford complete relief to some who suffer from calculus impacted in the renal region. (See Lecture XXXI.) Happily, however, a renal calculus generally comes down into the bladder, and is passed—say in ninety-nine cases out of a hundred—without any operation whatever. The patient has an attack of severe pain about the renal region right or left

(more frequently left), extending over the hip, passing into the groin and testicle, lasting for some hours, and mostly accompanied by vomiting; a group of very characteristic symptoms which commonly disappear with the descent of the calculus from the kidney to the bladder. Having arrived there, it is generally expelled by the urethra, either at once or after the lapse of a day or two, and there is an end of the matter for the present at all events. But they are often formed and descend without producing any symptoms, and are known to exist for the first time when thus expelled. In either case the patient ought to know, or must be told, that this occurrence shows a strong proclivity in his constitution towards the formation of stone, and he should immediately do all he can to prevent its continuing, as in the nature of things it has a tendency to do. (On this subject see Lecture XXV.) But if the bladder is unable to expel the calculus, it soon increases in size by deposit on its surface of more urates or of phosphates, and a very hard but rather brittle stone is formed in the course of time. All the stones which you see in this box have been passed through the urethra by the natural efforts; and it is worth observing how large a stone, one weighing fifteen grains, may be so passed in some cases. Usually, when they become as large as some of these, they fail to pass, and then some operation must be performed for their removal.

The phosphatic calculus is not often formed in the kidney; it is so sometimes, but is more commonly produced in the bladder. In the mucus of a diseased bladder much phosphate of lime is contained, and this meeting with phosphate of magnesia, a constant urinary product, together with ammonia from decomposed urine, a new combination results—viz. the ammoniaco-magnesian or 'triple' phosphate. This, again, combined with more phosphate of lime, makes what has long been called 'fusible calculus,' the commonest form met with. The structure of these calculi is not dense, and they are easily crushed.

The oxalate of lime, or mulberry calculus, I need scarcely tell you, is not originally formed in the bladder, but, like that of uric acid, in the kidney, and it is the hardest in structure and the roughest in external surface of all kinds.

But we must now hasten to consider what are the signs and symptoms of its presence, which calculus in the bladder

gives rise to. It often happens that a patient commences by telling you that he has passed some gravel for a year or two, and he may show you some small specimens of it which he has passed. For the last few months, perhaps, he has not seen any—a good sign he thinks, but to him a delusive one; for you may discover that during that period he has had some pain in passing his water, a fact which in these circumstances should strongly excite your suspicion. Accordingly we will seek our information by means of the questions always to be used.

First, you will commence with an inquiry as to the frequency of micturition. The patient has for some time had more or less undue frequency, and it is certainly more notable during the day when moving about, but is less observed at night, when he is at rest. The condition named is exactly the reverse of what takes place in prostatic enlargement, and hence it is a useful diagnostic sign.

You next ask for pain. The patient with calculus of the bladder almost always feels pain at one particular spot, the lower part of the glans penis, about an inch or less from the external meatus. Remember, you may have some pain there when there is no stone in the bladder, as in chronic prostatitis and in some affections of the bladder; but in stone it is almost always present, and is usually severe. Further, with regard to pain, the question should be asked, whether the patient feels it before, during, or after making water. He will tell you that it is during and after; whereas you know, in enlarged prostate, and in all cases in which urine is retained, the pain is before passing water, being occasioned by distension of the bladder, and the pain is relieved by the act of emptying it. A man with stone feels pain after making water, because the foreign body is then left in contact with the lining of the bladder, and being carried to its neck, severe smarting and a strong desire to micturate are felt, perhaps for four or five minutes after he has ceased to do so, until, fresh urine entering, the coats of the bladder are separated from the stone. And it often happens that pain is also felt at the same time near the anus just within the rectum.

The next question concerns the nature of the stream itself, of which little need be said. The stream is not narrowed as in stricture, nor enfeebled as in prostatic enlargement; but it

is said, in books especially, to stop suddenly as if checked for an instant by the stone being brought by the current to the neck of the bladder, and so acting as an obstacle to the outflow. I am bound, however, to tell you that this is a very rare occurrence in the elderly adult, although not uncommon in young subjects. I have made it my business for many years to ask for it, and my conclusion is that it is wholly useless, and untrustworthy as a sign, and ought never to be heard of again in that capacity. We pass on then to ask—

Fourthly: What is the condition of the urine itself? In many cases, in all when the stone is phosphatic, the urine contains some muco-pus, and this is occasionally stained by streaks of blood. When the stone is uric acid and in the early stage, the urine may be quite clear, but in time it becomes more or less clouded or muco-purulent with any calculus, if the patient's habits are active.

Then, lastly, you ask the patient if he has seen blood in the urine. Almost without exception blood has been passed at some time, and is seen in the urine by the naked eye; and almost invariably, even when no blood-tint is observed, a few corpuscles will be found by the microscope. But it is generally apparent after exercise, and therefore he can rarely ride on horseback or in a jolting vehicle without the appearance of a tinge of blood in the urine, nor without considerable pain. On the other hand, the bleeding caused by calculus is very rarely considerable—such, for example, as is sometimes seen in prostatic disease, and particularly in tumour of the bladder. Finally, all the symptoms of calculus are much intensified by any quick movements of the body. A patient, therefore, presenting himself with the conditions described ought always to be sounded.

Now, on this matter of 'Sounding,' I have something to say. It is an important procedure, and much depends on its being rightly executed. The term itself suggests one of the two signs, for the special production of which the inquiry is made. You desire to elicit an audible sound to be recognised by yourself and, if practicable, by another person, on striking the hard body sought for. The other sign is the sensation of contact between the instrument, a sound, and the hard surface of the stone, appreciated by your hand while engaged

in searching. A sound then must be a metallic instrument, and adapted by its form to explore freely the cavity of the bladder. It should be such an instrument as this, with a short curved beak, so that it can be turned to the right, to the left, above or below, with facility. An instrument with a large curve like that of a catheter cannot be rotated in the bladder, and hence is unfit for exploring that cavity. Moreover the beak should be a little larger than the shaft, and it should be somewhat weighted at the end. Thus a more complete impulse is attained on contact with a small stone, and a better note results. The curve here shown (fig. 48) is one of the

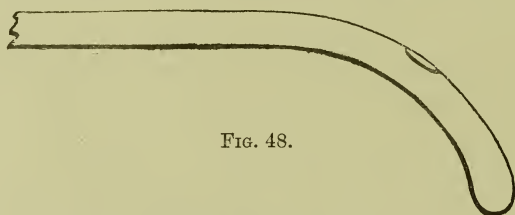


FIG. 48.

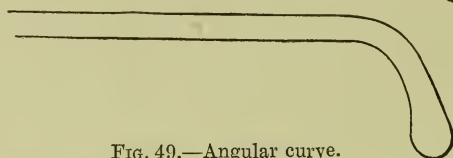


FIG. 49.—Angular curve.



FIG. 50.—An open rounded curve.

best for general purposes, but sometimes a more angular one is better, sometimes one less so with a rounder curve (figs. 49, 50).

When I entered this theatre, you may have heard me ask for the old hospital sounds, for I knew that I should find among them a good example of what a sound ought *not* to be. Here is one, for example, which no one could rotate in the bladder, or even find a small stone behind an enlarged prostate with, except by sheer accident. It has almost the form of a common catheter, and its only claim to be seen and handled now, is as an example of antiquated and obsolete instruments in a museum of surgical history. You will say,

naturally enough, 'Why are such sounds here, and who has used them?' I may reply, that they were invariably used thirty years ago, and they found a good many stones, too, in the hands of our illustrious predecessors. But I will answer for it, they have also missed many stones, especially those which were small. But these small stones, as we shall more clearly see hereafter, it is of the utmost importance not to miss, and to do so is a lamentable error I trust you will rarely make. I have no hesitation whatever in saying that more stones are missed than are found by imperfect modes of sounding still often adopted, as well as by employing inappropriate instruments, and especially if a sound in the form of a common catheter is relied on for the purpose. No doubt, if a large stone be present, you may find it easily with any instrument; but the object chiefly to be aimed at is the certainty of detecting small ones. As a rule, anybody can find a large stone; but a delicate and rightly trained hand is necessary to ensure the discovery of a small one. It is most desirable to detect the presence of a small stone, because if overlooked it will sooner or later become large, and then its removal must be a serious matter; whereas while it is small the operation is almost devoid of risk. You may promise the patient, in the case of a small stone, that it may be removed without hazard to life; whereas, in the case of a large stone, there is always some ground for apprehension, often considerable danger. It is impossible, therefore, to overrate the importance of finding all stones when small—which they inevitably must be during a long term of early history—and this you can only ensure with an appropriate sound, gently and intelligently applied.

In the next place, how are you to use this instrument?

You will observe that the patient now lying before you is resting on a tolerably firm mattress, with his head, not his shoulders, supported by a pillow; that there is a firm flat cushion beneath the pelvis, raising it about three or four inches above the rest of the body, and that the knees are flexed and therefore raised a little, while he maintains them widely apart.

I shall remark that the sound is by no means to be introduced in the same way as the ordinary catheter. With the ordinary catheter it is the custom in this country to stand at

the left side of the patient, and make a gentle sweep thus into the bladder. But with the sound you should take your place at the patient's right side. Holding the handle of the instrument thus, very lightly, between the thumb and finger of the right hand, the general direction being horizontal, introduce the beak into the meatus, gently drawing with your left hand the penis over the beak, and let this find its way slowly along the urethra as you bring the instrument round to the middle line above the patient's abdomen, gradually elevating the handle until the direction is nearly vertical. Now let it continue more or less in this position, descending the urethra by its own weight, while you do little more than support it, letting it find its own way, or at most but faintly pressing it onward. As it proceeds you will find the handle ready to sink downwards between the patient's thighs, and when it has arrived at a slanting direction there, the sound will probably slide easily down the incline into the cavity of the bladder.

At this very moment you may feel a slight graze as it passes, sufficing however to reveal to you the fact you are seeking; and a delightfully enchanting sensation it is to the young surgeon in eager pursuit of such coveted game. It may be easily perceived if the sound is only guided lightly by the faintest touch of the finger and thumb. If held and guided by the wrist and arm, so slight a graze may be unnoticed. Whether you have felt this or not, you are now to employ your sound in such a manner as to encounter a foreign body if there be one, however small; and to this end I shall advise you to proceed as follows.

When the sound has reached the bladder, hold the handle, whether circular or flat, lightly between the finger and thumb, and carry the beak gently down to the further end of the bladder. Then commence to make a series of light taps, rotating the shaft quickly each time, thus, to the right, as I withdraw the beak slowly to the neck of the bladder. Observe that I repeat the proceeding on the left side. If nothing is found, the beak being now at the vesical neck, a very likely spot by the way, for a small stone, gradually depress the handle of the sound between the patient's thighs, so that, instead of slanting downwards into the bladder as at first, the shaft now slants upwards somewhat to the bladder. You can now see

that I make a half turn, to direct the beak downwards and make an easy but rapid movement of it from side to side, in this position, watching intently for the little click which contact produces, and for the momentary sense of impact with a foreign body. You warn your patient to make no noise whatever for a minute or so at this critical period, that you may not fail to hear the tiniest note. Such is the system on which you are to act ; it is needless, indeed impossible, to describe minutely varying movements which practice will suggest as the best mode of exploring every part of the cavity, so as to recognise not only the stone, its size and nature, but the rugæ of the walls, the presence of prostatic outgrowth, of tumour, or of phosphatic deposit on the surface—conditions more or less rare.

Supposing that a stone has been discovered, its size is the first particular which it is desirable to ascertain. The sense of impact reveals broadly the facts of smallness or bigness, but does not suffice except in a very practised hand to convey information of an exact kind. Happily, with recent improvements, equally in the crushing and in the cutting operation, the question of size is now somewhat less important in relation to the choice between lithotomy and lithotritry than it formerly was, and special means of making an accurate measurement are seldom necessary. When they are, the lithotrite will generally suffice to determine the question, while the ordinary sound easily distinguishes small stones from great.

I formerly used special forms of sound for determining size, but these are generally unnecessary now, and the determination of size in relation to suitability of the operation required may be left until the patient is under the influence of an anæsthetic, when the question can be settled without inflicting pain, and the decision can be made and acted on at once.

If, however, in any exceptional circumstances you desire to attain an approximate estimate of the size of the calculus, you may employ a simple contrivance which I formerly found useful. This method irritates the bladder far less than measuring by means of a lithotrite. It consists in the mere addition to any ordinary sound of a little ring or collar which slides along the shaft, and which by proper manipulation enables us to ascertain very nearly the size of a stone, as you have frequently seen in the wards (fig. 51). The manner of using it is this.

Introduce the sound, feeling the stone as the end passes over it by a succession of delicate taps, until you have placed the end of the instrument distinctly beyond the farther or distant ex-

tremity of the calculus as it lies in the bladder. This done, slide the 'collar' down the shaft to the end of the penis, so that it touches the external meatus. Now draw the end of the sound outwards over the stone, delicately tapping as before, until you have reached its near extremity, which is most likely close to the neck of the bladder. The distance of the 'collar' from the end of the penis is the diameter of the stone in the direction traversed by the end of the sound.

At the same time it is desirable to learn what is the nature of the calculus. A phosphatic stone gives a very different note when struck with a sound from that given by the others. The specimen before me is dry, and therefore will not produce the note to which I refer. When wet, it is spongy and soft, with a rough surface, and always gives a dull note when struck; whereas calculi of oxalate of lime and of uric acid give out a note which is clear and sonorous. The habitual condition of the urine also may be evidence to some extent; if it is persistently acid, and if uric acid is frequently thrown down, you may conclude that the patient has a stone of that nature. If so, you may also find on inquiry that he has passed small calculi before; and seeing what these are, you may pretty safely infer that all belong to the same variety. In such a case it is highly probable that the patient empties his bladder perfectly by his own efforts.

On the other hand, if the urine is alkaline, and deposits phosphatic matter, you may very likely find that the patient is unable to empty his bladder by his own efforts, and requires a catheter, and you may conclude that it is a phosphatic stone, or, at all events, that it is largely covered with phosphates.

But we may sometimes be deceived by a mixed calculus;

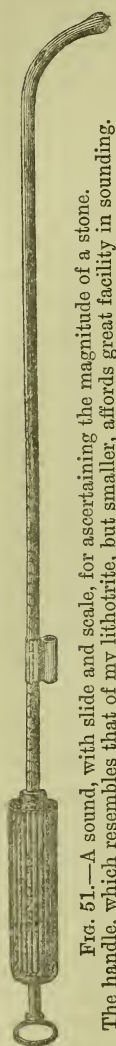


FIG. 51.—A sound, with slide and scale, for ascertaining the magnitude of a stone. The handle, which resembles that of my lithotrite, but smaller, affords great facility in sounding.

a uric-acid or an oxalate-of-lime calculus of considerable size may have a thick coating of phosphatic deposit, and thus its real nature may be hidden. The following is a case in point. Many years ago I had to operate on a large stone which was obviously phosphatic, and although large I had no doubt a few sittings would easily dispose of it. I had crushed four times, bringing away a good deal of phosphatic material, but observed that my lithotrite never went completely through the stone. At length it was clear that it only went a certain distance, and encountered a hardness which I was unable to crush. There was a very hard centre stone, on which my strongest lithotrite made no impression, a thick crust only having been removed. I well knew, from experience, the recoil of the lithotrite from an oxalate-of-lime stone, and had no hesitation in saying that such a one was present. Accordingly I performed lithotomy, and removed a large and well-marked specimen of that kind. In such a case there would not be oxalate of lime in the urine, but a large deposit of phosphates. It is worth remarking here, that in dealing with the hardest uric-acid stone in a lithotrite, an impression will be made by a turn of the screw, the jaws of the lithotrite will be felt to indent the stone even if they do not crush it; but a large oxalate-of-lime stone communicates a sensation when grasped by the instrument as if it were laying hold of a piece of iron—no impression whatever is made until sufficient force is applied, when it suddenly cracks.

The number of calculi present is the next thing to be ascertained. Usually there is only one, but occasionally there are more. There is a patient here on whom I shall perform lithotripsy to-morrow, who has two rather large uric-acid stones in the bladder. You may determine that point thus: Having seized one in the lithotrite, move it gently in every direction as a sound for others. If then you encounter one on one side and one on the other, you know that there must be at least three stones. There is a source of deception which you are liable to meet with in doing this, and it is necessary to guard you against it. While retaining the stone between the blades of the lithotrite, and moving the instrument from side to side in search of another, a rattling sound may be produced which resembles very closely that of contact with another stone. This arises because the stone seized is not firmly fixed between

the blades of the lithotrite, and it rattles between them. I have more than once seen the error committed of inferring a second stone from this cause.

Sometimes a great number of small calculi are present, varying between the size of a small nut and that of a pea, so that the rattle of several is heard, and, I may add, felt. These are favourable cases for a crushing operation, when compared with those in which a single calculus is present, taking equal weights. The large stone on being crushed results in large hard and sharp fragments. The small stones may be regarded as fragments already made, and also possessing a much less irritating form. Of course much less mechanical work is necessary to crush and remove the calculous matter in the last-named condition, being chiefly effected by the aspirator. In the patient's interest I would rather remove twelve drachms of such small calculi, than eight drachms in the form of a single stone. But when they are all small, they may be washed out with that instrument, in which case the operation is one for gravel or concretion, not for 'stone.' I have removed many thus, and so regarded them. Nothing demonstrates the presence of several calculi in a bladder better than the aspirator, the repeated clicks or rattle made by their rush in the current round the end of the evacuating catheter is quite characteristic. Just, too, as the aspirator has long been the best means of removing the last fragment in lithotrity, so it may sometimes easily detect the presence of a single little calculus, too small to be appreciated by the operator's tactile sense in sounding.

At the risk of repeating a little perhaps what I have said, I desire to impress upon you the extreme importance of watching, particularly in elderly men, for the appearance of the earliest symptoms of calculus, slight as they mostly are. I confess that it is surprising that a stone is so often permitted to attain considerable size before it is discovered. How does it happen that vesical calculus can ever become so without being discovered, since its symptoms ought to be unmistakable before it attains even medium size? Nevertheless I have no hesitation in asserting that more than half the stones I operate upon are found in cases in which no suspicion as to the real malady has arisen until the sound has been employed. It is only after a very large experience of

this kind that I venture to say that the early signs of calculus are not generally sufficiently recognised. Occasionally, but very rarely, I have met with cases in which the obvious early signs of calculus were absent. In the great majority of patients these signs appear to me quite unmistakable. They may be present, or nearly all of them, when no calculus exists ; but being present, the sound always ought to be used.

Let me describe to you the typical form of calculous case which is apt to be overlooked. It is that of a healthy-looking man between 55 and 65 years of age, with good family history as to longevity, tainted perhaps with gout, one or two cases of it existing, antecedently or in a collateral branch ; or in its absence, some record of gravel or stone in an ancestor. He has never been the subject of any characteristic or other attack of pain in the back or hip, suggesting calculous formation. Nevertheless he has been known to pass a little uric-acid concretion or two without pain, and has been told that it is 'merely prostatic ;' a curious but common error ! Or his very slight discomforts are attributed 'to that little weakness of the bladder which all people have as they advance in years.' Deceptive axiom ! But what are these slight discomforts ? They consist chiefly of a little undue frequency of passing urine, together with a slight pain—a mere passing sting, mostly present at the close of the act of micturition, in the end of the penis. And occasionally it happens, indeed it may probably be ascertained, that some day lately, after a walk, or after an hour or two in the saddle, a little blood was observed in the urine first passed afterwards—soon forgotten, or, if named to the attendant, was followed by the recommendation not to take such exercise again ; the significant sign arousing no suspicion of the true cause ; so, such exercise not being taken again, the occurrence does not reappear, which again comforts and consoles the patient. Well, after listening to such a history, I am always morally certain that one or two small stones exist, and of course the sound is introduced at once, and almost invariably a small stone or more are discovered. No anxiety need arise, and the patient may now with reason be congratulated, since a small stone is certainly the safest solution of his symptoms ; for, as I have already said, the malady for the most part occurs in

people of otherwise good health and strong constitutions. I have no hesitation then in saying that these instances occurring at the time of life named, and marked only by the signs described, form the great bulk of calculous cases in this country, and that they are also the most frequently overlooked. Hence it is that I have made this special *résumé* of their characters.

There are no more special topics for inquiry in relation to diagnosis to bring before you. Of course, in prosecuting those already considered, you cannot fail to discover narrow stricture, enlarged prostate, or marked vesical disease of any kind, should these be present. Further, you will not fail to examine for the presence or absence of constitutional albumen and of sugar in the urine, to observe the state of the patient's digestion and nutrition, and of the vital functions generally—a manifest duty in view of any serious impending operation.

LECTURE XVII.

THE TREATMENT OF STONE BY OPERATION FOR ITS REMOVAL.—
LITHOTRITY.

GENTLEMEN,—We have just seen a patient in the ward with a stone in his bladder. Of that fact we are absolutely certain. I have touched it with the sound, which is but a lengthened finger, conveying a sensation, as we have already seen, that is not only proof of contact with a solid body, but enables me to form a tolerably correct conception of its size and nature. Moreover, you who have not touched the sound possess the evidence afforded by a distinctly audible note, which occurred simultaneously with each quick impulse given by my hand to the instrument, the beak of which lay within the patient's bladder.

Now the problem before us is, how to remove that stone from the inside of the body to the outside, with safety to the patient, and, if possible, the object is to be effected speedily, and with little suffering—all of which is happily expressed by that terse but comprehensive old Latin formula, *tuto, cito, et jucunde*.

It is said that concerning every practicable proposal in this world, there are three methods of procedure possible. That axiom may be accepted, with a proviso, here.

There is, firstly, the method of cutting a passage by which to remove the stone entire. There is, secondly, the method of crushing it into fragments sufficiently small to be removed through the narrow passage by which the urine issues. And thirdly, there is a method vaunted for dissolving the stone *in situ*, so that it may be evacuated in a fluid form by the same route. The proviso is, that the last-named method is applicable, if it be applicable at all, so very rarely, that it cannot be considered except in the earliest stages of the complaint.

How far the action by solvents is practicable or desirable will form the subject of a lecture hereafter, for the subject is certainly one of considerable interest and importance.

Practically, then, but two of the three courses are open to us in the ordinary and typical case before us. And in order to determine which of these is preferable, the size of the calculus suffices in this and in most other cases. It is not particularly small, but it certainly is not large, and therefore it is manifestly a stone to be crushed. I may remark that formerly, when there was no other method than that by the knife for removing the stone, there was less need to ascertain its size precisely than at present, when a choice of two methods can be made. At the present day it is of some importance to determine size, because if you operate with utter indifference to that fact, you may obtain worse results from adopting two procedures, than by employing the knife for every case that comes before you without discrimination. For example, if you were to attempt to remove the largest stones by crushing, and used the knife only for the small ones, you might, and probably would, incur a greater mortality than if you simply adopted lithotomy in every instance. When the system of crushing first appeared, it was unquestionably a rather clumsy procedure; and when the cases were not judiciously selected, when surgeons operated without making a diagnosis relating to the points I have enumerated—crushing stones for patients that ought to have been cut, and cutting for stones which might have been crushed—the entire mortality resulting from operations for stone actually became greater for a time than it had been previously, when every patient was cut. I cannot give you a more pertinent illustration of the necessity of choosing the operation judiciously for each case. Further considerations on the choice of operation for particular cases will be discussed after we have become familiar with the operative procedure of various kinds available for the purpose.

Now of these two methods, familiarly known to you as Lithotomy and Lithotrity, we shall consider the latter first, as being by far the more generally applicable of the two; while the former and the more ancient operation will be relegated to the second place.

Lithotrity is the product of the present century, and is

therefore essentially modern. Lithotomy was practised long before the Christian era, and its history is interwoven with many associations of antiquarian interest, as we shall see hereafter. And I think the best way of commencing a study of either operation is to give you a brief sketch of its rise and progress. Therefore, in relation to lithotrity we shall rapidly trace the steps by which the original methods and instruments attained, through progressive improvements, the high degree of power and efficiency which modern lithotrites and aspirators possess.

Lithotrity, as an operation, owes its existence to the French surgeons, mainly to Civiale ; but the labours of Leroy d'Etiolles, Amussat, and others were not without value in developing a system. My old friend Civiale, who died in 1867, at a good old age, and full of honours, was the first to crush a stone successfully in the living subject ; and this he did in the year 1824, with instruments which he had designed in 1817. No one pretends to deny that something resembling the process had occasionally been accomplished by a patient thus to relieve himself. At any rate, it is known that once a man succeeded in grinding down a little stone in his bladder with a small file, an achievement which has been dignified, not altogether without reason, with the title to be reckoned as an operation of lithotrity. But the first surgeon who designed and performed a systematic operation on the living patient was Civiale, and he operated on his first two patients before a committee of the Academy of Medicine of Paris, with this instrument that I hold in my hand, and presented to me, I may add, by himself. You see how different it is from anything we now employ. It is a straight instrument, with a central axis and three claws, which were made to project after its introduction into the bladder. [The manner of using it is shown.] You see what a very different mode of proceeding that is from the method now adopted. The mechanical action was produced by rapidly rotating the central axis by means of a bow, and thus drilling holes in the calculus in various directions until it gave way, and each fragment was subjected to a similar process, until the whole was converted into *débris*. Notwithstanding the tedious character and the difficulty of the procedure, it was, to a certain extent, a successful operation. The *débris* issued by

the natural act of micturition, and no special means were adopted to withdraw the fragments at first, the only apparatus employed being that which reduced them to powder, and also occasionally brought to light a small bit between its claws when removed. But not long afterwards systematic attempts were made to remove the débris mechanically, and so shorten what had hitherto been a tedious process. And thus from an early period in its history—the instruments employed in lithotrity consisted of two distinct kinds; viz.—

First, those employed for crushing the stone ; and

Second, those for removing the débris.

We will consider first the instruments employed to crush the stone, or lithotrites.

Civiale's remarkable achievement was naturally followed by various attempts of different kinds, the earliest of which may remain unnoticed, seeing that they were speedily discarded as failures in practice. The first notable and important advance consisted in the production of an instrument in which pressure between two blades, placed at nearly a right angle with the shaft, constituted the agency by which force is applied. It was designed and constructed by the first Mr. John Weiss, of London, at so early a period as the date of Civiale's first operation (1824). This system of crushing soon replaced the perforator, and although Weiss's instrument has since been modified in several particulars, his system is still the favourite one with all operators. While the method of Civiale was originally perforation and grinding, lithotrity became after Weiss's instrument was invented what it still is at this day, namely, a process of crushing and grinding. Whatever else you do afterwards, that process forms the essential preliminary stage of the operation ; hence the propriety, in my opinion, of retaining the original and now familiar term Lithotrity to distinguish the modern procedure from the ancient process of cutting, still more familiar as Lithotomy.

Let me here ask you to observe that a lithotrite always consists of two chief parts : viz. the prehensile part, which is employed within the bladder to seize and grasp the calculus ; and the power-regulating part, or that which is external, to receive and distribute the force applied by the hand. It was the first-named part, above referred to, which at this early

period was so nearly brought to perfection by the English maker.

The next improvements were those which related to the second chief part, which transmits the force to the crushing blades. Various ways of aiding and modifying this were tried. One well-known method consisted in fastening the patient to a special bed, to which an extremely large and clumsy lithotrite was, after being introduced into the bladder, fixed by a vice, and the force communicated by blows from a hammer. (Heurteloup, Paris, 1832.) This system was tried in London, and elsewhere, but was relinquished for that of the screw, as soon as the application of power by its means was adapted to the lithotrite. It is said to have been first suggested by Mr. Hodgson, of Birmingham, but it was practically rendered feasible by Weiss, who devoted himself to this branch of his art with great intelligence and zeal. Subsequently slight modifications were made by Mr. Costello, who, having studied the new operation in Paris with Heurteloup, came over here to advocate and practise it ; and, among others, by Mr. L'Estrange, of Dublin.

Improvements were slowly made in the lithotrite up to the period I have been speaking of, 1840-55, and I shall now show you one of about the last-named date. It has, you see, become considerably smaller, and therefore less likely to injure the urethra than its large and clumsy predecessors, but the power is applied only by means of a thumb-screw, which works very slowly. Nevertheless, it is the instrument with which Sir B. Brodie earned his success, and it is handled thus. [Explanation.] You see how much time is wasted, not only in the action of screwing home to crush a fragment, but in unscrewing in order to prepare the blades to seize another. No amount of crushing worth the performance could be executed in less than a quarter of an hour, and sittings of a much longer duration than this were quite common in using this instrument in order to reduce a small stone. Another change, useful in its day, was that in which the power was regulated by means of the rack and pinion ; this was due to Sir William Fergusson, who used it almost to the end of his career, and by its means he shortened the process considerably.

The next improvement was a very great one, and is due to Civiale and to the late M. Charrière, of Paris. An ingenious



FIG. 52.—Lithotrite of Civiale and Charrière.

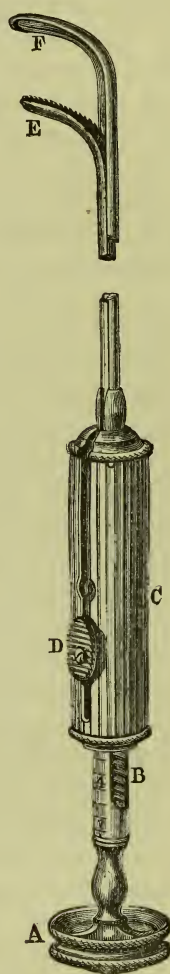


FIG. 53.—Author's first lithotrite with cylindrical handle.

- A, Wheel-shaped end of sliding shaft, held in the operator's right hand, which directs the movements of the male blade E. B, The screw. D, The button, which throws the screw into gear, or releases it, as desired. C, The cylindrical handle attached by the stem or shaft to the female blade, F.

mechanism in the handle, moved by a disc there, enabled the operator to exchange the screw-movement for a sliding one at

will, and *vice versâ*. This saved all the time lost by the slow process of unscrewing, necessary to open the blades of the previous instruments every time they have been closed (fig. 52).

We now come to the lithotrite before you, the cylindrical handle of which, I may perhaps be permitted to state, is my own suggestion and design (fig. 53); and this, together with an improved mode of changing the screw into sliding action, made at this time by Messrs. Weiss, have rendered it a much more effective and convenient instrument than its predecessors. And this combination has been adopted almost universally throughout Europe; and of course, as would naturally happen, various 'modifications' of it have been made by instrument makers and others, some of them no doubt having been devised through want of acquaintance with the proper mode of using the original instrument. The principle of the cylindrical handle, which is the most important element in the changes made, is, however, retained in all the varieties—among others, in the lithotrites which Professor Bigelow has lately devised—and this circumstance is the best tribute which could be paid to its value.

In what respect does it differ from previously constructed handles? Its form permitting it to be easily rotated between the finger and thumb, enables you, in the search for a small stone or small fragments, to execute rapid and delicate movements which would be impossible with an instrument without the cylindrical handle. It also enables us to operate in less time than any other lithotrite requires, and with less disturbance to the bladder. Anything that will diminish the duration of the operation, and the amount of movement and concussion to the organs concerned, will necessarily give a greater prospect of success.

I next call your attention to the prehensile part of the lithotrite, consisting of 'jaws' or 'blades,' by which the calculus is to be seized and crushed; and you will observe that of these there are two leading specific varieties, termed 'fenestrated' and 'non-fenestrated.' Whenever the stone is large and hard, it is necessary to begin with the fenestrated instrument—one in which the outer or 'female' blade is entirely perforated, allowing the inner or 'male' blade to pass through it. This mode of construction furnishes the most powerful lithotrites,

those with which the hardest work must be done. At the same time the large opening provides that no blocking of the blades with *débris* can occur, because all this is driven through the opening, or falls away right and left on the outside. The edges should be well bevelled, and the general contour should be such as to avoid injurious contact between its toothed or cutting parts and the walls of the bladder.

Representations are given of two varieties (figs. 54 and 55); the latter is preferable, having a form less liable to injure the

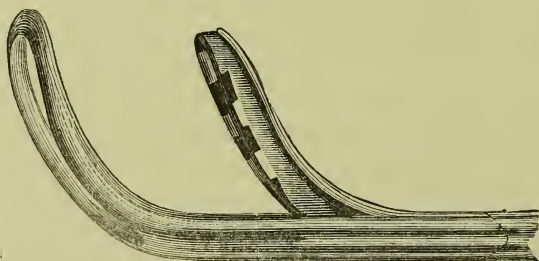


FIG. 54.—A fenestrated lithotrite.

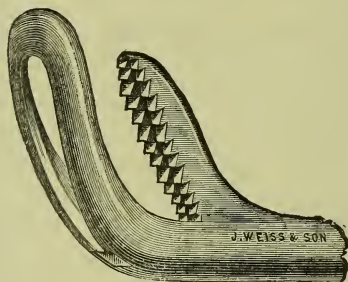


FIG. 55.—Another form of fenestrated lithotrite.

bladder than the former, although with due care there is no risk with either.

After a large calculus has been broken into numerous small fragments by these instruments, the crushing into *débris* sufficiently small to pass through a large evacuating catheter is best accomplished by means of partially fenestrated and 'flat-bladed' instruments. Even in the latter, an adequate opening should be made in the female blade to prevent blocking of the angle between the two blades with impacted *débris*. They are then adapted to the majority of cases, in which the

stone is of small size, or, indeed, of any size up to that, say, of a filbert, or an almond in its shell. They are more convenient and manageable than large and heavy instruments, and their blades are so flat that little space in the bladder is required to include a stone between them, beyond that which the stone itself demands ; which cannot be said of the large and deep blades necessary to the former kind. When closed, the edges of the blades, which are well bevelled, do not exactly meet, the male blade being always narrower than the female, so that a groove exists all round between them, by which included *débris*, when too much is present, can be expelled. Pressure of the stone between such blades has a tendency to produce small *débris* rather than large fragments ; furthermore such instruments, even in the hands of a tyro, can scarcely be so used as to injure the bladder (fig. 58).

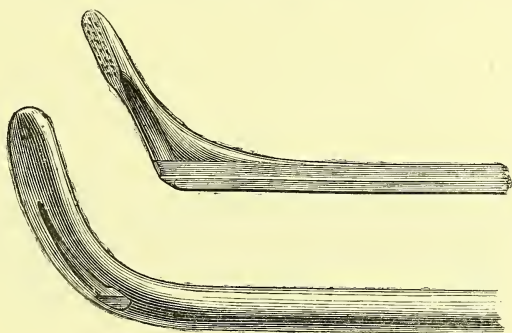


FIG. 56.—‘Partially fenestrated’ or ‘semi-fenestrated’ lithotrite. The opening in the female blade is represented a little smaller than it actually is.

The partially fenestrated or semi-fenestrated lithotrite is a very useful form which I have adopted somewhat recently, since the one-sitting operation has come into vogue. While it is comparatively small and light, and therefore incapable, with proper use, of injuring either urethra or bladder, it is quite strong enough to reduce large portions of hard calculus to small fragments fitted to pass by an evacuator of No. 16 in size (English). And it is capable also of dealing with an entire medium-sized uric-acid calculus. Being narrow and wedge-shaped in the lower part of the male blade, which moreover completely penetrates the female blade by a narrow opening, its power of cutting or dividing is considerable, while

by the upper and wider part of the blade a firm grip on the fragment is secured, and a good result in *débris* is obtained as soon as the fragment gives way. (See fig. 56.)

Lastly, there are the flat-bladed lithotrites, of which I shall show you two distinct varieties designed for the performance of two different kinds of work required. (1) The male blade may be made narrower than usual, and more or less wedge-

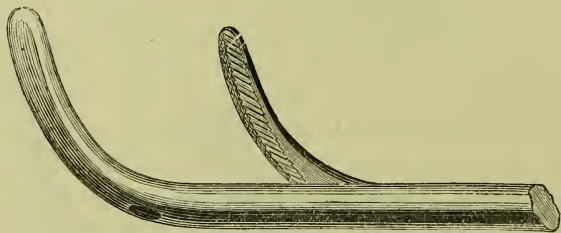


FIG. 57.—Lithotrite with male blade very slightly wedge-shaped: the opening in the female blade should be much larger than that represented here.

shaped, and then the function of the instrument is that of dealing with rather harder stones, and to make fragments rather than *débris* (fig. 57).¹ Such an one should be also more fenestrated, and it should, of course, be rather stouter than the ordinary model. (2) The male blade may be made almost

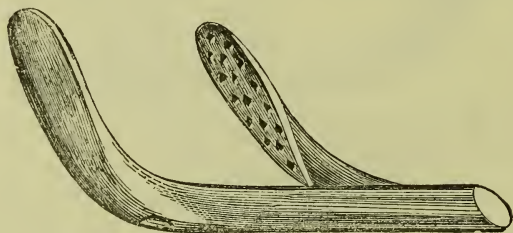


FIG. 58.—Lithotrite with flat blade; the opening in female blade should be much larger.

as wide as the female, and then the function of the instrument is to make fine *débris*; and its use is to complete the work

¹ Only slight approximation to the form of the wedge in the opposing surface of the male blade is permissible. If it has an angle, say, of 90 degrees, some danger is incurred; it may be driven through almost any stone, it is true, but the fragments will fly off right and left with prodigious force, even in fluid, and injure the coats of the bladder. Also, when the male blade has the form of a rather sharp wedge, the calculus is seized and retained with greater difficulty than with a male blade which is less salient.

commenced by the first (fig. 58). The wider the blades are, the more liable they are, of course, to become impacted with *débris* in the bladder. At the angle of the female blade there should always be some opening as large as can be made without materially weakening the instrument there, in order to permit impacted *débris* to escape; while, as I show you, rapid backward and forward rotary movements of the wheel at the handle (the screw being *in gear*) will expel much of the *débris* at the sides.¹ A collateral advantage of this flat-bladed instrument is that it will hold a good deal of fine *débris* without undue augmentation of its size, so that not a little can be safely brought away by the urethra if desired, whenever the instrument is withdrawn.

Such instruments should be made of steel of the finest temper, cut from the solid block (not forged), so as to be completely trustworthy. The power and leverage of the screw in the handle should correspond with the strength of the blades, and therefore with the amount of work they have to do. When prolonged crushing is necessary, as is often the case now, the

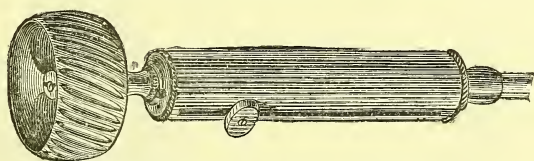


FIG. 59.—Broad handle for lithotrite.

handle may be widened and rounded with advantage. The form annexed (see fig. 59) is that which I prefer and employ; it is not heavy or clumsy, and offers a satisfactory form for grasping firmly. One lithotrite of each kind, the narrower and the wider male blade, in addition to a strong semi-fenestrated one, suffice for all cases of moderate-sized stone in the adult.

The next instruments we have to speak of belong to the second class of instruments, those for removing *débris*, viz.

¹ It is worthy of remark that in the construction of the flat-bladed lithotrite it should be provided, if by mischance its power is overtaxed and fracture at some spot is inevitable, that it *must* take place at the union of the beak of the male blade with the shaft, so that the beak only is broken off. If such an accident occurs, the lithotrite can be withdrawn as usual, and the small portion left in the bladder can be removed by another lithotrite.

evacuating catheters and aspirators. Very early in the history of lithotrity it was apparent enough to the surgeon that he might render his patient essential service if he could remove the débris, as well as crush the stone. Some of it of course might pass by the expulsive action of the bladder, which is considerable in its natural condition; but a fragment might be impacted in the urethra, or several would irritate the neck of the bladder, and occasion great trouble both to the patient and his attendants, to say nothing of the risk to life from severe cystitis, occasioned by the presence of these foreign bodies. Hence it became customary after a sitting to introduce

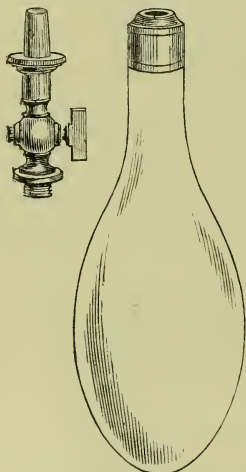


FIG. 60.—Sir Philip Crampton's aspirator.

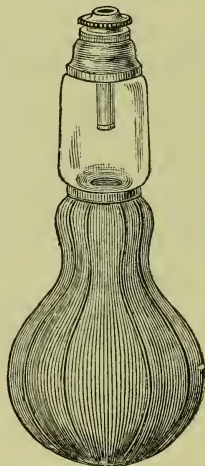


FIG. 61.—Clover's aspirator.

a large catheter, and to inject a strong current of water from an eight-ounce syringe, the result being often less efficacious than one might have expected. Heurteloup, particularly, employed means of this kind (1840–50). Indeed he was the first to insist on the importance of always evacuating the bladder, if possible, at one sitting in all cases of lithotrity; and invented a name to mark this feature of his operation viz. ‘Lithocénose,’ from λίθος, stone, and κένωσις, extraction. He failed simply because, without anæsthesia, then unknown, the process was too prolonged and too painful. About the same time the method by exhaustion, or ‘suction,’ was employed, by Sir Philip Crampton, of Dublin, who attached a glass receiver, like a large

soda-water bottle, previously exhausted of air by a syringe, to a large catheter, achieving a result which was to a certain extent successful (1846). This was the first aspirator. He was good enough to send me one of them to try, but the trouble and delay of exhausting the bottle, and the violent rush which took place in applying it, unfitted it for practical use (fig. 60).

No further advance took place in this direction until early in the year 1865, when Mr. Clover designed an indiarubber aspirator with a glass cylinder, trapped to prevent reflux of fragments, which answered its purpose very well (fig. 61). I used it for the first time on the 10th of April in that year

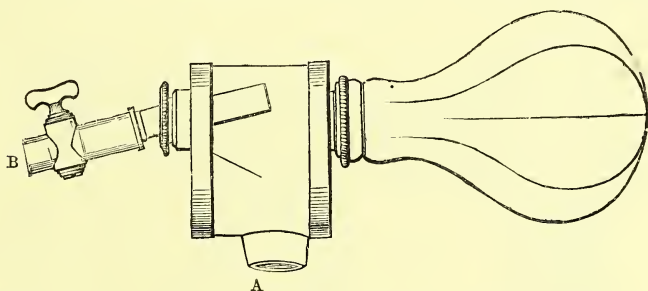


FIG. 62.—Clover's aspirator, modified by the author. The glass receiver is oval in section, long diameter being from above downwards. At its lower part is the opening, closed by cork at A, for emptying and washing. The portion shown at fig. 63 is attached here if desired. B, Tap and tube for attaching the evacuating catheter.

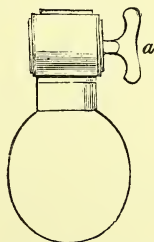


FIG. 63.—The glass trap to retain fragments which may be shut off from the receiver above (seen at fig. 62, A) by turning the tap a.

(1865), in a case of lithotripsy, which I operated on in connection with my friend Mr. C. A. Aikin, Hyde Park, and I employed it as an auxiliary more or less ever afterwards. From the date named to about 1878 I used it some hundreds of times. I modified it subsequently, rendering it more efficient and powerful, maintaining its original character of simplicity (fig. 62).

In 1878 an important change was proposed, as is well known, by Professor Bigelow, of Harvard, U.S. He advised that the stone, however large, and without respect to the presence of chronic cystitis or other complications, should be removed at one sitting, by means of more powerful lithotrites, larger evacuating catheters, and a stronger indiarubber bottle than had before been used,—no matter how long the time which might be necessary to accomplish the task. He believed that less damage would be inflicted upon the bladder and associated organs by a long single sitting, provided the viscus was completely emptied of *débris* thereby, than by the old process of taking away a little and often, but leaving in the cavity large rough fragments, often causing continued and serious irritation. In order to carry out his idea he designed an aspirator having attached to its upper extremity a long large flexible tube, to communicate with the evacuating catheter. This method did not answer well in practice from the liability of air to find its

way to the upper part of the tube, and greatly interfere with the efflux of *débris*.

Accordingly, for the purpose of the new procedure, I constructed one especially powerful, yet light and small, so as to be easily grasped and governed by one hand, but with an opening *at the top*, by which it could be filled with water, to which all air accidentally admitted, if any, would arise, and by which it could escape. The lower part was connected with the evacuating catheter by the shortest route to the bladder, and in such a manner that the aspirator can be detached with ease, and without loss of any contained water in so doing. Lastly, there was a trap into which all fragments must fall, and by which they are securely retained. (See fig. 64.) From time to time I have made further modifications which increased the power of the instrument, and made regurgitation by fair use impossible. The most recent of these

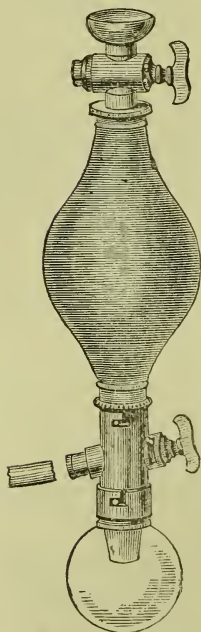


FIG. 64.—Original aspirator of the author.

is shown at fig. 65, and I think this form is now free from any

of the objections which my experience of the one-sitting operation has brought to light against previously existing varieties. A valve composed of a coarse wire grating hangs over the tube within the glass receiver, and closes it only during the rush of water into the bladder. The moment this has ceased the valve hangs well away from the tube, the end of which is cut very obliquely in order that débris may pass freely, while a

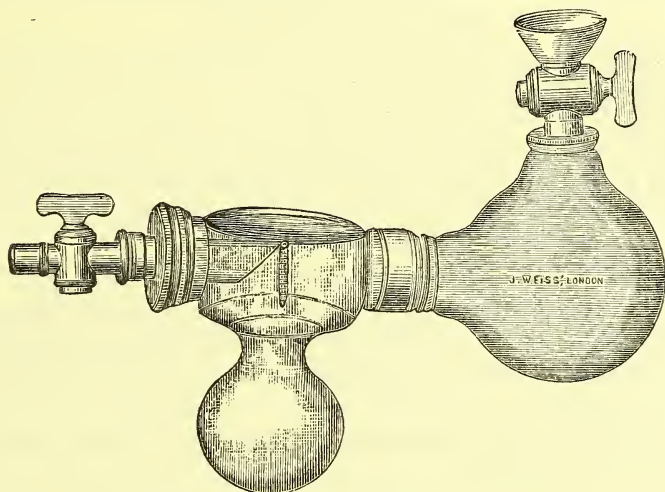


FIG. 65.—Latest modification of author's aspirator.

little indiarubber buffer attached at the bottom of the valve prevents its adhesion to the end of the tube. The receiver is made of one entire piece of blown glass shaped to catch the débris, and the joints between it and the metal are so constructed as to avoid indiarubber 'washers' &c. which in a tropical climate soon cease to act and render aspirators depending on such materials useless. (See fig. 65.)

The evacuating catheter to be attached to the aspirator should be as large as the urethra will fairly admit; usually Nos. 14 to 16 of the English scale may be used without any trouble. Sometimes Nos. 17 or 18 are admissible; but such sizes are quite unnecessary with small stones, and may produce mischief, while No. 14 amply suffices for these: hence large evacuators are only to be used where the presence of a large stone demands such instruments. The curves employed differ, and the apertures may vary in situation; a choice of

various forms should be available for different cases. (See fig. 66.)

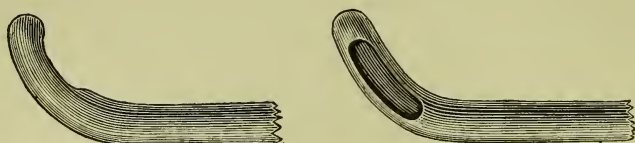


FIG. 66.—Evacuating catheters.

Such are the instruments required for the modern operation of lithotrity. Accessory ones are : large conical metal bougies to ascertain the size of the urethra, in relation to the evacuating catheters which may be required, or to facilitate their introduction. Also a scalpel or short urethrotome, to divide the external meatus, should be at hand, which may be necessary when the latter is narrow. Urethral lithoclasts, long forceps, and other contrivances to remove fragments impacted in the urethra, will be very rarely wanted if we remove the débris by aspirator, as ought now almost in every case to be accomplished.

I shall illustrate the actual performance of the operation at our next meeting.

LECTURE XVIII.

PRACTICAL DIRECTIONS FOR PERFORMING THE OPERATION OF
LITHOTRITY.

GENTLEMEN,—Before describing to you in detail the best method of performing lithotrity to-day, let us inquire, in order that we may have a clear idea of the matter in hand, what is the problem which this operation proposes to solve?

To this I shall reply, that it consists in removing by mechanical means a calculus from the bladder, without inflicting any injury, either on that organ or on the urethra.

That is the object we desire to attain, in adopting the method by crushing. I do not say that it is always practicable, but that it ought to be so in most cases. Any notable injury, however, which the patient sustains from the operation is for the most part occasioned, either by the selection of improper instruments, or by injudicious modes of using them; and is therefore generally to be avoided by the exercise of judgment, care, and a fair amount of skill.

Now, I need hardly say that by any cutting operation such a solution of the problem is impossible. The surgeon must inflict at the outset a severe injury in the shape of a large and deep wound, and this necessarily constitutes a considerable risk. In lithotrity, on the other hand, he produces no lesion, intentionally. Formerly the stone itself, when broken up into large angular fragments and left in the bladder, was a cause of injury to the organ, severe cystitis and often hæmorrhage being frequently induced by their presence. Hence it was even then an established principle guiding all our proceedings that the process of crushing the stone should be conducted in such a way as not to leave within the bladder many large and sharp fragments.

Now, however, that we adopt the method of emptying the

bladder at one sitting, this danger from the broken stone no longer exists. In fact, it is the avoidance of the evils produced by broken stone when remaining in the bladder which constitutes the superiority of the one-sitting operation.

But the instruments themselves, and the methods of using them, may still, as ever, be productive of much injury, both to the bladder and to the urethra. Hence, it has always been my object, first, to render the action of the lithotrite itself as easy and speedy as possible :—secondly, to employ all instruments of the smallest size, compatible with strength and efficiency, for the work required :—and thirdly, to diminish as much as possible the amount of manipulation employed, and the time devoted to the process.

And I may here remind you that lithotrity had been brought to a high degree of perfection, chiefly by Civiale, before anæsthesia was discovered; and after its introduction that skilful operator, whose experience was more considerable than that of any other surgeon, still preferred to crush without the aid of ether. By degrees, however, anæsthesia was generally adopted in this country, and one consequence was that we gradually ventured to crush more than formerly at each sitting, and more largely adopted the aspirator. We at first adhered more or less to the master's cautious style, and, unless the calculus was small, followed him in employing three, four, or even eight or ten sittings, if the stone were large, before emptying the bladder. For myself, as is well known, I have used chloroform or ether, more or less, for the last twenty years at least; and further, whenever severe cystitis appeared after the first or second sitting, I almost invariably operated at once, removing the whole of the calculus if possible at a final sitting, however long, as the best means of treating the inflammation. It was the adoption of anæsthesia alone which enabled me to adopt this practice. And later still it rendered possible the method of Bigelow, of removing all the débris at one sitting, however large the stone; a modification which has been fully proved by myself and others to be a most valuable improvement, indeed the greatest of modern time, in connection with lithotrity.

I am compelled here to note a fact relating to this subject, viz. that Professor Bigelow proposed also to change the name

of the operation, terming it Litholopaxy in place of Lithotrity. But the facts of the case afford no warrant for this change. Bigelow's procedure does not introduce any principle or mode of action that was not employed before, and the term designed by him to distinguish his method as a novel one, because he evacuated the débris as well as crushed the stone, is not justly applicable, since evacuation has for forty or fifty years formed a very important part of the crushing operation, as I showed you when sketching its history in my last lecture.

Hence I proposed, and always employ, the term ‘Lithotrity at one sitting,’ or ‘at a single sitting,’ to distinguish his operation, as conveying accurately the essential change which he proposed; and I think it is now pretty generally accepted.

It is this method which alone I have now to bring before you. Instead of taking away, little by little, a portion of the stone, at five or six successive sittings of not more than three to six minutes each, performed every third or fourth day, until the whole was removed, the operation is completed at the first sitting. Formerly, we used the most delicate lithotrites, handling them often in the lightest manner, with an eye on the patient's countenance (when, as often happened, he did not take ether), whose consciousness enabled us to judge how far we might tax his endurance. Now, we employ heavier instruments, and while care is as necessary as ever, and experience and tact in the management of them are more than ever valuable in dealing with unusually hard and large calculi, the amount of work to be done, especially in such cases, demands a vigorous hand and wrist, strong, well-made apparatus, and as large as the urethra will fairly admit.

Supposing we have decided to perform the one-sitting operation for any given patient, with a stone of average size; if he has never had any instrument in his bladder before, and the urethra is not very capacious, a young surgeon may do well to pass a bougie once or twice before operating, to make certain of a good route into the bladder. Such a proceeding, however, is very rarely necessary.

Secondly:—You should not be indifferent to the state of the patient's general health. You ought not to operate during or too soon after an attack of fever, nor until you are satisfied that the digestion is in fair order, and the bowels are acting

tolerably well. You are in short to ascertain that the local organs, and the whole system, are in a favourable condition at the outset. If the patient's habits have been of necessity too active, as in the case of the labouring man who has been compelled to work almost up to the time of his admission to the hospital, a few days' quiet in bed may be beneficial before commencing surgical treatment.

THE OPERATION.—The patient can be in no better situation than lying in his bed warmly covered, with long woollen stockings to protect the lower extremities from chill in case of long exposure: the mattress beneath should be firm. If a long operation is anticipated on account of the size of the stone, the warmth of the bed and the coverings referred to are important. The operating table ordinarily employed is too high for the surgeon's convenience, and the air of an operating theatre is often less desirable than the warmth of the ward or bedroom, together with that of the bed itself—for a rather large stone may demand twenty or thirty minutes. The longest term I have occupied has been seventy minutes; it was for a hard uric-acid calculus, of which the *débris* weighed $2\frac{3}{4}$ ounces; the whole was completely removed in that time, and no untoward symptoms followed. But an exposure to cold air or draughts during such a period of time might of itself imperil some patients' lives: hence the importance of these suggestions at the outset.

[Here a patient is brought in and placed on a couch arranged as a bed.]

The next point to be observed is the position of the patient. He should lie close to the edge of the bed, so that his right side is easily accessible to the operator; a small pillow should support the head, not the shoulders, which should rest flat on the bed itself; a firm flat cushion, about three or four inches thick, should be placed under the pelvis; the knees should be moderately raised and flexed, and kept wide apart—held thus, if necessary, by an assistant on the side opposite to the operator.

The ether having been administered, I always take a conical steel bougie or dilator, about, say, 12 (English) at the point and 15 or 16 two or three inches higher up, in order to ascertain the condition of the urethra.

If the meatus does not admit the bougie, at once divide the floor of the urethra there with a scalpel or urethrotome. If the dilator now passes with ease, the required space exists and the operation commences ; if not, a smaller one is employed, and dilatation by means of two or three of these instruments passed one after another will probably accomplish all that is necessary. Of course, if any notable stricture is present it must be dealt with as such ; moreover, its presence ought to be determined beforehand, and is not to be first discovered when an operation for crushing is arranged to commence.

The lithotrite has now to be introduced.

I have already mentioned that there is a difference in the mode of introducing the lithotrite and the catheter. You know that in passing a catheter, we, in this country, stand on the left side of the patient ; in France, the surgeon stands on the right side. In passing the silver catheter for a recumbent patient, you hold it somewhat horizontally, draw the penis gently over it, slowly raising the handle to the vertical position, and then with a gentle sweep depressing it towards or between the thighs, when the extremity of the instrument rises into the bladder.

In passing the lithotrite a different movement is required. You may be on either side, but for this purpose place yourself on the right side, as already directed, because that is the convenient side for operating, while it shows want of dexterity and wastes time to go round from the left to the right of the patient to operate after having passed the lithotrite. Well, then, standing at his right side, and partially turning your left shoulder to his face, you hold the lithotrite horizontally in your right hand, introduce the blades, gently drawing the penis over them as you slowly traverse the urethra with the instrument some four inches, during which the shaft gradually rises nearly to the vertical position. Arrived at this point, you retain it in that position for a few seconds, allowing it to go on sinking, as it were, by its own weight, still vertical, until the blades have slipped beneath the pubic arch. This done, you gently depress the handle, already slightly inclined, towards the thighs, as the opposite end is felt to slide easily into the bladder. There is no in-

strument which traverses the urethra more easily than the lithotrite if properly managed.

You observe, of course, that there has been no preliminary injecting of the bladder, a procedure which is unnecessary. Formerly it was said to be dangerous to use a lithotrite in the bladder unless there were four or five ounces of water present, to prevent the coats of the organ being seized or otherwise injured by the blades. The instruments which I use are so made that it is impossible with ordinary care to meet with such an accident. A very small quantity of fluid, say one or two ounces, is ample for the purpose; even an empty bladder is better than one containing eight or ten ounces. If no instruction has been given to the patient, the first-named quantity is probably present; being 'nervous,'

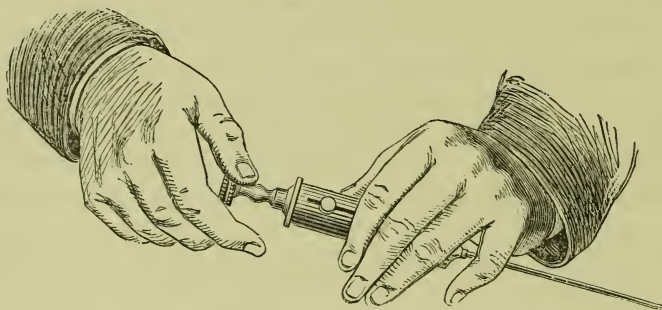


FIG. 67.—Manner of handling the lithotrite in the bladder when searching.

he will have passed water shortly before the operation. A large quantity is fatal to certainty in seizing, because currents are produced by movements of the lithotrite, and the position of the stone is constantly shifting.

Let me ask you to notice that the lower end of the lithotrite has evidently reached the bottom of the bladder, it should rest there two or three seconds. I have now to find the stone and seize it. In order to do this, I hold the cylinder lightly between the fingers of the left hand, and taking the wheel-shaped handle of the sliding shaft attached to the male blade with my right, I draw it outwards as far as it will go easily, without hurting the neck of the bladder, which the male blade now reaches. After a second's pause, I close the male blade and am almost certain to feel a check caused by the grip of the blades on

the hard body. A moment's firm pressure shows if the stone be firmly retained, and does not slip. I then draw towards me the little button on the cylinder with the thumb of the right hand, which action changes the sliding movement into a screwing one, turn the handle, and crush. You know by the resistance felt, and even by the sound of the crash, whether the male blade has gone through the midst of the stone, making a heap of fragments, or has merely broken a bit of the edge. In either case, the button is pushed back to its former position, the blades are re-opened, and the first fragment found between them is seized and crushed as before.

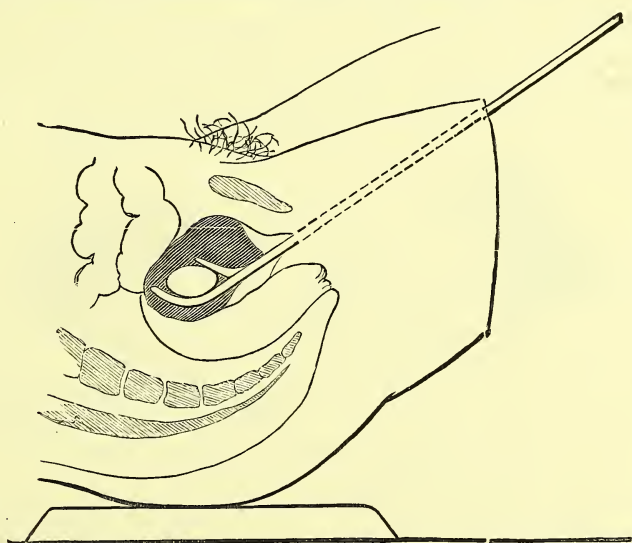


FIG. 68.—Ordinary position for lithotrity. Lithotrite open and closed on a stone: showing relations of parts.

[Fig. 68 shows the position of the patient, and fig. 69 the action of both hands, when holding firmly and crushing.]

Let me repeat my instructions at this point, because I desire you should learn this simple lesson well. As soon as the lithotrite has reached the bladder for the first time, don't be in a hurry to proceed with rapid and eager movements of it to find the stone. The stone is rarely to be secured thus. Wait quietly for three seconds that the movements of the water may subside. Recollect that the stone lies in a fluid medium, and that it is easily swayed to and fro by currents therein, occasioned by

the lithotrite on entering. Then quietly open and slowly close. That is all. That is the secret of finding the stone, which hasty excited operators find difficult, and quiet men who know the secret, find easy. When the stone is not so found—and this occasionally happens—then it lies mostly so close to the neck of the bladder, that both blades of the lithotrite are beyond it, and every time you pull out the male blade, the stone is drawn closer towards you, but never falls into the grasp of your instrument. You feel the stone, even hear a little grating sound every time you open and close; and nothing is more perplexing than the futile action which results, especially if you are watched by expectant lookers-on. Don't forget this: and that effective seizure will probably be made by sliding the lithotrite close up to the neck of the bladder, and opening by pushing downwards the female blade. What-

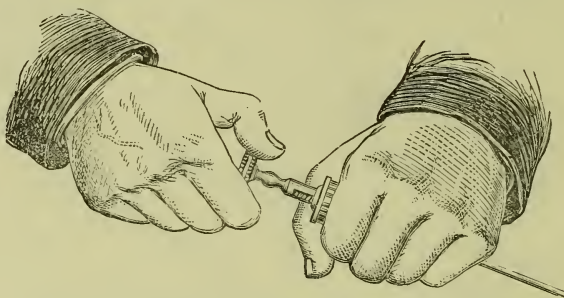


FIG. 69.—Holding the lithotrite firmly and crushing.

ever manœuvre you find the best to adopt, that is the object to be attained; the most common cause of difficulty in seizing the stone being its close proximity to the internal meatus of the urethra.

Supposing you have seized and crushed once or twice, the process is to be repeated several times until a fair quantity of débris has been made, and, if the stone is not large, until no pieces are seized which appear to be too large to issue by the evacuating catheter. In this manner, some eight or ten minutes may have been occupied, and it is probably desirable now to introduce the evacuating catheter, and remove the débris from the field of action before proceeding further. This latter process I shall advert to presently. Having done this, you may still feel a fragment, one or more, too large to enter the

evacuating catheter; and on seeking it with a lithotrite, you may fail in the attempt. For it may lie deeply, hidden behind an enlarged prostate, or it may be small and be partially covered between rugæ, nestled in some inaccessible crevice. In seeking it, you would turn the blades to the right, then open and close them, and finding nothing, would perform the same movement to the left. Again finding nothing, you would next depress the handle of the lithotrite, and turn it half-way round, so that the blades are reversed and point downwards; and then if you open and close, a small fragment may be caught and crushed deep behind the prostate. (See fig. 70.)

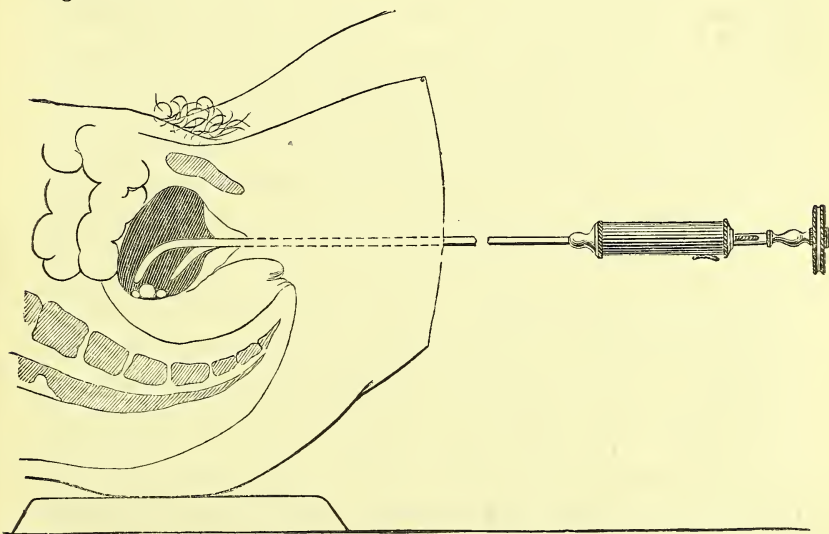


FIG. 70.—Lithotrite with reversed blades in searching for small fragments.

At this point I may give you a useful hint to guide your mode of proceeding. Whenever you have found a stone, or a good-sized fragment, and have crushed it, keep the lithotrite exactly in that place, and although you may have had some trouble in finding the calculus, you will now continue to find it several times running. I have often been reminded thus of some early experiences in fishing for perch: when you have caught one, you may catch, perhaps, twenty or thirty more from the same deep place in the stream, if you will but stop there, and not go fishing about among the shallows. So in

lithotrity, you may continue to seize and crush if you contrive to keep the lithotrite precisely in the same place. In fact, there is what may be called a certain favourite 'area' in every bladder in which to operate—a certain spot which is a favourite haunt, so to speak, for fragments of stone. If you find that out in each bladder, you will always be able to crush the fragments; if you do not, you may often have some difficulty in discovering them. The area will, of course, vary somewhat with the position of the patient. When the patient is standing, for instance, the area is not the same as when he is in a lying posture. In the latter case it is desirable to raise the pelvis two or three inches, in order to get an area for operating which is not too close to the neck of the bladder. The neck of the bladder is a very sensitive part, and drawing out the male blade hastily may readily injure it. One of your maxims in lithotrity should be never to pull out too forcibly the male blade. It should be pulled out carefully and delicately, so as to *feel* the neck; and it is a bad lithotrite if the male blade does not slide with perfect ease, so as to enable you to perceive the slightest contact with the neck of the bladder when, in opening the jaws, the male blade is drawn towards it. The diagrams fig. 68 and fig. 70 with the lithotrite in the bladder, will show what I mean by the area for operating. If the patient is lying without a cushion, it will be nearer the neck of the bladder than if the pelvis is well raised. It is still more essential in the case of an enlarged prostate to put a high cushion under the pelvis, in order to throw back the fragments to the posterior part of the bladder, so that the area may be as far from the neck as possible.

Here let me admonish you to crush all the fragments very completely. Do not attempt to withdraw large portions of the calculus by the lithotrite through the urethra, which may be injured by the act, even seriously: any fragment, being seized, can also be crushed, by a single turn of the screw. It is very imprudent to subject the neck of the bladder and the urethra to pain and injury by forcibly dragging through the latter a sharp angular fragment of stone! Never, on any pretence, withdraw a lithotrite with such a fragment, or overloaded with débris, if you can possibly avoid the necessity for

doing so. Our object is to crush the stone into *débris* capable of being extracted safely through the evacuating catheter.

I will now suppose that the whole of the stone has been reduced to *débris*, or apparently so; the lithotrite is withdrawn, and an evacuating catheter, say No. 16, is passed into the bladder, giving issue probably to an ounce or two of urine, containing some pulverised material, into the vessel which should be ready placed to receive it. The aspirator—and it is more advantageous to have two ready than one—having been previously filled with a solution of one part of pure carbolic acid in 1000 of warm water (ten minims to the pint) is held in the right hand, and attached firmly to the end of the catheter held by your left. The communicating tap being turned, the right hand makes pressure and drives two or three ounces into the bladder, for it is not necessary to inject much fluid at each pressure of the aspirator; on the contrary, the entry of an ounce at a time often acts more efficiently than a larger quantity. On relaxing pressure, the outward flow is seen into the spherical glass receiver, usually carrying with it several fragments, often most numerous at the cessation of the current, or even after it. This alternate entry and exit of fluid is maintained by the right hand several times, with a few moments of interval between each, by which time there is often a considerable amount of *débris* in the receiver, the action being repeated until *débris* ceases to pass, or nearly so.

Lastly, it is worthy of note that the action of the aspirator almost always enables us to decide whether the last fragment has been removed or not. The rattle of fragments against the end of the evacuating catheter in the bladder is very distinctly heard and felt; and as these become removed by the current, the rattle diminishes, until at last a single tap perhaps only is felt, proceeding from a single piece just too large to enter the aperture of the evacuating catheter. This piece may be crushed and washed out, after which, if nothing whatever can be felt or heard, a strong presumption exists that all has been removed. In short, the aspirator is an excellent test of a completed operation, as well as an excellent means of rendering it complete.

I may say here that there are two or three maxims relating

to the practical management of this apparently simple proceeding which are worthy to be remembered.

First, when the patient's respiration is very deep, as it often is when ether is inhaled, let the act of injecting water into the bladder by the aspirator coincide with the act of expiration, and you will find no resistance to the hand. If, on the contrary, you attempt to inject during an act of deep inspiration, obstruction is encountered, and little effect is produced. In the same circumstances let the expansion of the aspirator, and consequently the exit of its contents, take place synchronously with an act of inspiration, and you will find the current and the passage of débris promoted. When the breathing is shallow and tranquil, as is usually the case, no attention to this is necessary.

Secondly, when after a large crushing there is much débris to be removed, do not let the end of the evacuating catheter rest on the floor, since it is then apt to become blocked, but let it be at about the centre of the bladder. On the contrary, when most of the débris is removed, and you are seeking a remaining fragment or two, the end of the catheter should be depressed or resting on the floor of the bladder.

Thirdly, if you perceive a sudden check to the outflow of the current towards the aspirator, and that the indiarubber reservoir suddenly ceases to distend, you may infer that a small rounded calculus, or a fragment nearly filling the channel of the catheter, stops the way. In these circumstances, press rather smartly on the aspirator two or three times, so as to expel a strong current of water, and this will most likely displace the obstructing body and reopen the channel. If this does not dislodge the obstruction, and enable the aspirator to resume its function, the catheter must be withdrawn and the piece of calculus removed.

The proceeding which I have thus described is adapted to the great majority of calculi met with in the adult male: that is, of oxalate of lime weighing up to about six or eight drachms, and of uric acid up to one and a half or two ounces, speaking roughly and expressing a general rule. More considerable stones than these can be safely crushed by experienced hands, if it is considered desirable to do so. Large calculi require for removal a term varying from fifteen to thirty

minutes or more, according to size, and to the dexterity of the operator. Phosphatic calculi are more easily disposed of, and larger weights may be attacked. With large examples of the other kinds, a strong fenestrated lithotrite should be used at first to break the mass into fragments, and then a semi-fenestrated one may be employed with advantage. To avoid possibility of blocking, this should be withdrawn after using it about three minutes, and be reintroduced; and when the stone is large, the evacuator should be applied to withdraw a quantity of débris before the crushing is completed. Thus the lithotrite may be changed three or four times perhaps, and the evacuator applied afresh two or three times, before the operation is finished; while stones of the largest size may be treated on the same principle, by a still larger number of introductions, if deemed necessary.

One of the most important rules I can give you is, always to employ instruments which are proportioned in size to the stone which is to be removed. The larger the lithotrite, the more irritating it is to the passages; hence it should never be larger than the work to be done requires. I have seen great mischief, and even a fatal result, occasioned by employing a large lithotrite which has split the urethra, in order to remove a stone which might have been easily and safely disposed of by a lithotrite of appropriate, that is of small, size. I cannot too strongly reprobate such ill-judged or careless proceedings, which are not only disastrous to the unhappy subject of them, but discredit one of the most safe and certainly successful operations, when properly conducted, in the whole domain of surgery.

In order to crush a small calculus, or a concretion, ether is very often quite unnecessary. With a light hand it should be removed with very little pain. But a solution of cocaine may be employed if thought desirable, although I think, if an anæsthetic is required, nothing is so satisfactory as ether. However, if you choose to employ cocaine, let the bladder be emptied, then inject two ounces of a five per cent. solution, and leave it there, removing the catheter. Next, throw one drachm and a half of the same solution by means of a syringe into the urethra, retaining it there ten minutes. You may then let it escape and commence the operation at once. You

will find very little pain complained of if you operate properly.

Immediately after a sitting, a hot linseed poultice should be placed above the pubes, and is a comfort to the patient. Pain and irritation are always much relieved by the repetition of this, or by very hot fomentation-flannels to the parts. The bowels should act the day before or on the morning of the sitting, so that the patient may not have to rise soon after the operation and make efforts at stool. But if he is suffering severely, say three or four hours after the operation—a condition, by the way, which is uncommon—a hot hip-bath, as hot as he can bear it, for fifteen minutes mitigates pain and straining. My practice is, however, not to disturb the patient thus, but to give a subcutaneous injection of morphia, which almost invariably gives great and speedy relief. The subsequent treatment for the first three or four days in cases of large calculus is that of a mild acute cystitis: recumbent position, external warmth, frequent hot hip-baths, and small but frequent doses of solution of potash, just to neutralise the acidity of the urine. If the urethra is overstretched or bruised, after the removal of an unusually large stone, a soft flexible catheter may be tied in for twenty-four hours or so, but this is not frequently necessary; while, if the bladder had previously lost the power of emptying itself, such an inlying catheter for a day or two is mostly better than frequent catheterism.

The patient should occupy his bed for at least a week after the operation. Occasionally this regimen may appear unnecessarily stringent. I have in times past had reason to regret non-adherence to the rule, and now I very rarely permit a patient to leave his bed before that time, and I am sure the practice is a desirable one. At a later meeting I shall tell you how best to meet troubles which may arise during this period and subsequently. If he is free from fever, he may enjoy light non-stimulating diet in moderate variety: light soups, fish, poultry, game, farinaceous puddings, vegetables, and a little fruit; and you will remember, as he is unable to take any exercise, that some assistance will probably be necessary—mild laxatives or enema—to ensure a daily action of the bowels, which is extremely desirable for his comfort as well as for his health.

LECTURE XIX.

THE AFTER TROUBLES OF LITHOTRITY.

GENTLEMEN,—It has often been remarked that the operation of lithotrity demands for its successful performance attention to several apparently minute details ; not one of which is unimportant. And I am bound to tell you that when the operation is over, when indeed a full week has elapsed therefrom, which was the stage we reached at the end of the last lecture, there are still several directions and details of treatment which must on no account be overlooked.

It is greatly due to neglect of these that certain ‘after troubles’ are met with, in connection with lithotrity, which rarely appear after lithotomy ; and although some of these have been diminished by the one-sitting operation, there are still not a few exceptional cases in which disappointing results are liable to occur. I shall begin by dealing with them *seriatim*.

The first, is the appearance of subacute cystitis soon after the operation : with a tendency to be obstinate and continuous. In a case that does well, the bladder manifests its relief from the absence of all calculous matter, by becoming healthy within a very few days after the operation, and transmitting pure, clear urine free from any trace of blood and pus. Sometimes, however, the urine may at first remain cloudy for a week or more, with some muco-purulent deposit, or with a trace of blood ; while the bladder is more or less irritable, so that the patient can only retain his urine about half the natural time, or even less, and complains of more or less pain in passing it. And then in a few days these symptoms disappear and he gets well. If, however, such recovery does not take place, we must seek the cause ; and in considering this we shall review most of the ‘after troubles.’

There are several causes of subacute cystitis after lithotrity to be enumerated:—1. An unremoved fragment of calculus. 2. Contagion conveyed by instruments which have not been perfectly cleaned. 3. Loss of power on the part of the bladder to empty itself completely. 4. Simple persistence of cystitis once originated by the irritation of the stone, and temporarily aggravated by the operation of removing it.

1. An unremoved fragment. This happily is a less frequent cause than it was before the ‘single sitting’ operation was introduced. In nine cases out of ten, the last fragment is removed as all the preceding have been, namely, by the aspirator, which is the chief agent in removing *débris* from the beginning to the end of the procedure. Moreover, operating now with the deliberate intention of removing everything at once, and without the temptation to postpone further manipulation to a subsequent sitting, when perhaps it might be more productive than to-day, the last fragment is almost invariably pumped out by the aspirator, or picked out by the lithotrite before the operation is concluded. But occasionally there will be a refractory bit left, and its presence is indicated by painful and frequent micturition, by the presence of a little blood in the urine; and these conditions are notably aggravated by movement. In such circumstances, after a few days, ether must be again administered, and the offender sought. Occasionally, however, such a fragment may attempt to pass by the urethra and become impacted there. This is a very rare occurrence, and I think if you adopt the mode of manipulation I have advised and thoroughly pulverise the stone, you will very seldom meet with it. I have never had to open the urethra to remove a fragment in my life. I have had occasionally to remove one by the forceps, and notwithstanding the many complicated instruments invented for this purpose, I know nothing so efficient as the common long forceps which I show you here (fig. 71). If necessary, then, by gentle handling and tact, you will relieve your patient by their aid. An ordinary curette may be sometimes useful (fig. 72), and should form part of the armamentarium.

But suppose there is reason to believe that a fragment remains in the bladder just too large to pass, a lithotrite should be selected with short wide rounded blades, by means of which

you can explore easily in the reversed position. With this instrument you may search the whole floor of the bladder with

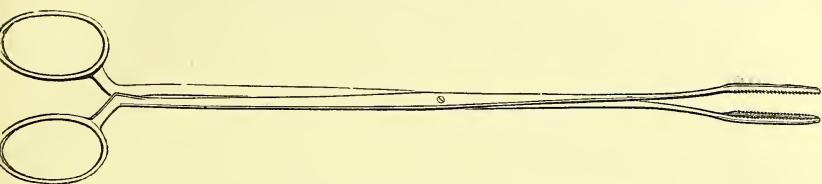


FIG. 71.—Long urethral forceps for removing fragments.



FIG. 72.—A curette.

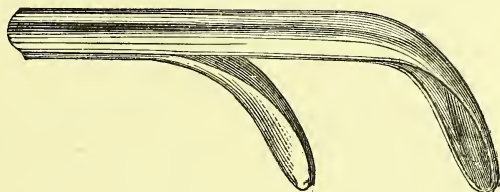


FIG. 73.

perfect safety. And for this purpose the cylindrical handle especially is of great value (see fig. 73).

It is quite easy to procure an audible note from a fragment no bigger than a split pea, as I have times without number

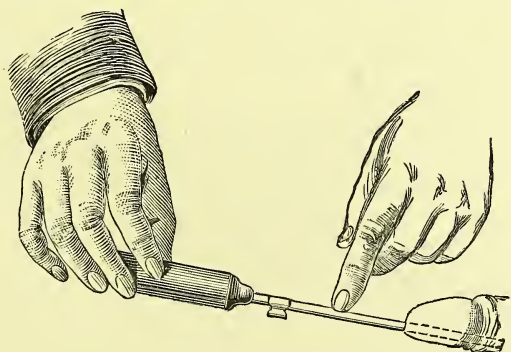


FIG. 74.—Mode of searching for the last fragment; the blades turned downwards.

demonstrated in the wards and elsewhere, withdrawing the little bit entire after it has been struck for the purpose of

verifying the observation. The handle of the lithotrite should be depressed, the beak turned downwards behind the prostate, and the forefinger of the left hand placed on the shaft an inch below the handle. Very slight and quick rotary movements, alternately right and left, should be made with the right fingers lightly holding the cylindrical handle, while the shaft turns on the end of the left index as on a pivot or fulcrum. The sound is to be used in the same manner (fig. 74).

2. It sometimes happens that the patient, who up to about the fifth day has appeared all but well, with clear urine and free from pain and frequent micturition, has a slight shiver, accompanied by turbid urine, irritability of the bladder—in fact a mild attack of cystitis. Such circumstances are strongly provocative of suspicion that contagion has been transmitted by means of instruments not absolutely clean. For it is easy to perceive that a lithotrite, unless scrupulously cleansed and disinfected, is well adapted by its conformation to retain a minute quantity of purulent or other morbid fluid, and to convey morbid matter to the next patient for whom the instrument is required. Such an accident ought never to occur. Happily this form of cystitis is not usually very prolonged or troublesome, and gives way to the treatment described under a subsequent head. Never forget, however, to wash your lithotrites and evacuators with a solution of soda and carbolic acid in boiling water after each operation, and lightly smear them with carbolised oil before putting them aside. [See further remarks in Lecture XXVII., On the Treatment of Cystitis].

3. Take care to ascertain whether the patient is habitually emptying his bladder completely by his own efforts. Not only are many elderly calculous patients liable to fail in this act from commencing enlargement of the prostate, but there is no doubt that a prolonged crushing, and large use of the aspirator will sometimes occasion temporary diminution in the power of the vesical coats to contract completely. Let him pass water when a natural want occurs, quietly, by himself if necessary, that he may do his best to empty the bladder, and when satisfied that he has done so, pass a soft small flexible catheter, and if anything like half an ounce of urine is drawn off, you must teach him to use the catheter two or

three times a day, and observe the effect of this treatment on his condition. It is remarkable how small a quantity of residual urine will give rise to pain and irritation, and how insignificant an amount may, if neglected, gradually increase and form a nidus for the deposit of a phosphatic stone. Let me say at once that negligence in relation to this matter is the chief cause, beyond all question, of the subsequent troubles which occasionally become evident at an early period after the stone has been removed, and which have constituted, in a certain proportion of cases in elderly men, sources of discredit to the crushing operation.

Indeed I have only learned during the last few years how extremely small a quantity of urine habitually left behind in an elderly patient's bladder after each act of micturition, provided that he is undergoing, or has just undergone, lithotrity, suffices to lead to phosphatic deposit and to chronic cystitis. You will scarcely believe me that one drachm, or one drachm and a half only, of this residual urine is enough, in exceptional cases, to produce the condition so feared and detested by every lithotritist;¹ and I now add, that if the condition is detected early, and this small quantity is promptly and frequently removed by the patient himself, which he can easily do with a soft coudée or a vulcanised rubber catheter, almost certainly the dreaded symptoms will not appear.

In rare instances, after troubles are due to the escape of a small fragment into a sacculus in the bladder, where it becomes the source of irritation, phosphatic deposit, and occasions the formation of a fresh vesical calculus, with ceaseless discomfort and requiring repetitions of the crushing process to relieve it.

4. A continuance of simple cystitis after the operation, no obvious cause being present, is sometimes met with, and gives rise to the set of symptoms already described. In this case as well as in others, the treatment may be sketched as follows. Commence with daily injections of the bladder, and these the patient may be taught to make for himself, should their con-

¹ It is not to be supposed that I regard so small a quantity as equally important in a patient whose urine is clear, who is not the subject of any chronic cystitis, and who is not undergoing lithotrity. In an elderly man the presence of a drachm or two of 'residual' urine suggests that at some future time he may require the catheter, but certainly it would not yet be necessary.

tinuous use be necessary. For this purpose the four-ounce indiarubber bottle, with brass nozzle and stopcock fitting a flexible catheter of moderate size, is the best instrument—one-half only of its contents is to be injected at a time, and this quantity is to run out before the succeeding half is introduced. To the water should be always added either carbolic acid in a proportion not exceeding one grain to the ounce, or a saturated solution of boracic acid, six or eight minims to the ounce. Either of these disinfecting solutions should be employed as preliminary to all other injections; they are not in the slightest degree irritant to the bladder, and they deodorise and cleanse the interior. Further—and this is a fact of some importance—carbolic acid does not decompose any solution of metallic salts which it may be desirable to inject afterwards or in combination.

But in order to remedy the condition of the mucous membrane, nothing is equal to a weak solution of nitrate of silver, and it often speedily produces marked improvement. Use a standard solution containing one grain to the drachm of water, and add not more than half a drachm of this to four ounces of ordinary warm water, if not hard, for the first injection. A very slight smarting only should be felt for a short time afterwards; and then it can be used twice daily. The strength may be increased slightly, short of producing pain, and I rarely find more than one drachm of the solution necessary. It has a marvellously beneficial influence in most of these cases; only in a few exceptional instances, it is required to be used continuously for a few weeks instead of a few days only.

Among the after troubles of lithotrity the last to be considered is the reappearance of stone in the patient's bladder.

The most common course of a patient's history subsequent to the operation of lithotrity is—and I say this after an experience, as you know, of many hundred cases carefully watched and inquired after—a complete immunity from the reappearance of calculus, and immunity also from troublesome urinary symptoms. There are, indeed, hundreds of men enjoying life, free from their former symptoms, in each of whom a successful operation of lithotrity has checked, once for all, the pain and danger incident to the presence of a

stone in the bladder. On the other hand, there is a certain proportion of patients in whom stone reappears; a circumstance more commonly observed since the milder operation of lithotritry has replaced the more fatal procedure by the knife.

This latter class comprises two very distinct categories: the one consisting of individuals with a strongly marked tendency to produce uric acid, and who continue to form calculi of that material during many years. On several patients I have operated for no less than three consecutively formed uric-acid calculi, intervals of three or four years elapsing between the formation of these calculi; while in two patients I have done this four times: one of the last-named instances is living and engaged in an active mercantile life at this moment (1888) upwards of eighty years of age. You are probably aware that some patients produce with considerable frequency a small uric-acid calculus, so that every two, three, or four months a small pisiform body finds its way from the kidney to the bladder, and, if too large to quit it by the urethra, remains in the cavity. Thus a number are often collected long before the symptoms become severe and demand relief. No doubt by well-chosen regimen and diet the formation may be checked or altogether stopped. But this fact, that the operation of crushing may be repeated, is so far from being a discredit to the surgical art, that it must, on the contrary, be claimed as a notable triumph, since a safe and easy delivery from fatal issue is thus attainable as often as the occasion requires.

When lithotomy was the only mode of removing the stone, it was impossible to submit to that grave operation such patients as often as their circumstances might occasionally demand; and as it was far more fatal than lithotritry, it sometimes prevented, but too effectually, the possibility of fresh formation!

The other category consists of that large number of persons who have lost, most commonly from the presence of enlarged prostate, the power of emptying the bladder by the natural efforts, and habitually retaining decomposed and alkaline urine, sometimes become the subjects of phosphatic calculus of considerable size. And as after the operation the same condition continues, it often happens that after two

or three years another calculus is formed, and is similarly removed. In other cases a chronic tendency to produce phosphatic matter constantly is established, small calculi are rapidly produced, and many persons owe their lives and much comfort to the fact, that once or twice a year some phosphatic mass can be easily and safely got rid of by means of the lithotrite and aspirator. But the result in these conditions should not be regarded as a calculus, nor the proceeding itself an operation for the 'stone.' Hence I have in practice termed these small and recurring bodies 'concretions,' in order to draw a needful distinction between these and the large primary formations. I have removed at least 200 or 300 of these small bodies without placing them in my list of stone cases. Moreover, we can do much to get rid of them in the earliest stage of recently formed crystalline matter. It is the presence of adhering mucus, or even fibrinous deposit, after long-continued cystitis, to the coats of the bladder which makes our efforts often ineffective or uncertain and entails failure. This condition mechanically shields the phosphatic deposit to a certain extent from the chemical action of solvent injections, as well as from the influence of a powerful current thrown into the bladder by the aspirator.

The most useful formula I can offer you as a solvent for these deposits is the following:—

Dilute acetic acid, an ounce ;
Carbolic acid, pure, a drachm ;
Acetate of lead, four scruples ;
Water, to four ounces.

Of this solution add one drachm to four ounces of tepid water, and inject two ounces at a time, as elsewhere directed, once or twice daily.

For washing out mechanically, a stronger instrument and a more powerful current are necessary. You may teach the patient (who may or may not be habitually using the catheter to empty his bladder) to use every second or third day the following apparatus (fig. 75).

(1) A thin flexible catheter, No. 11 or No. 12 in size, and with polished interior, so as to facilitate the passage of débris through it (the ordinary French flexible catheters are thick and have often rough interiors), with a large oval eye on the

upper surface of its extremity, which is slightly turned up. A silk web catheter often answers best (fig. 75 A).

(2) An eight-ounce indiarubber bottle, with a brass nozzle (B), which fits over the outer end of the catheter, and not into

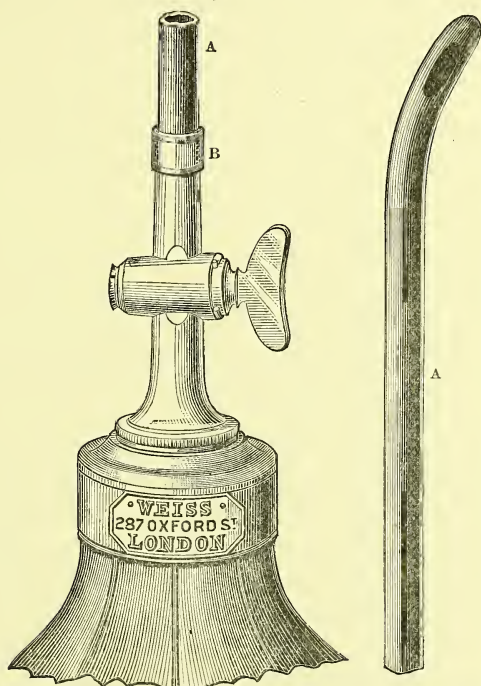


FIG. 75.—A. The catheter described. B. The nozzle of the bottle, which fits *over* the end of the catheter, A.

it. The manifest result of this mode of attachment is, that a powerful uninterrupted current can enter and issue from the bladder; indeed, it is scarcely possible that loose débris should remain in the organ under the influence of the action of this apparatus, unless much adhesive mucus is present. It may also be used as an aspirator, with a backward and forward current, if desired. For the patient's own use it is even more easy than the four-ounce bottle just alluded to, since the size and freedom of the channel—not narrowed at the point of contact between bottle and catheter—permit the fluid to be propelled with very slight pressure.

I alluded at the outset to the fact that the appearance of

chronic cystitis after lithotrity was more frequent with the original operation by several sittings than it is after the present method by one sitting. It has been said, but I think hastily, that this modification has banished these unhappy cases from practice. I regret to say, indeed, that this cannot be affirmed. I think one of the most persistent examples of phosphatic cystitis I have seen of late years followed an operation in which I removed with great ease a small uric-acid calculus (84 grains) at one sitting, and a few other instances of a similar kind, although less severe, have happened. But when the original calculus has been phosphatic, removed from a bladder habitually emptied by the catheter on account of considerable enlargement of the prostate, while chronic cystitis has pre-existed, this condition is almost invariably much diminished by the operation; but its continued existence in such a case is often to some extent a necessary concomitant of the organic changes in the organs, and involves no discredit to the surgical procedure.

But I am justified in concluding that the occurrence of the morbid condition of the bladder following lithotrity for uric-acid and oxalate-of-lime calculi in previously healthy organs is observed less frequently than heretofore. In order to guard against the danger, our first care should be to avoid, in every case where it is possible to do so, the use of instruments, whether for crushing or evacuating, which over-distend and irritate the urethra and neck of the bladder. At least our rule must be not to employ larger instruments than the size of the stone demands. I cannot too earnestly warn the inexperienced lithotritist against the needless risk he incurs when, in presence of a small or moderate sized stone (and the majority met with belong to one of these two categories), he uses the heavy lithotrite and the large evacuating tubes which have of late been introduced into this country. In order to remove two or three hundred grains of calculous matter from the bladder—and many calculi weigh less than a hundred grains, while all ought to be found before they attain that weight—it is wholly unnecessary, I will even say it is unwarrantable, to introduce lithotrites and evacuators with the diameter of No. 18 English scale into the bladder. I am certain that the mere splitting (for it is not dilatation) of the

urethra and neck of the bladder which sometimes follows the introduction of such instruments, has sufficed to produce symptoms often distressingly painful, sometimes obstinate in duration, occasionally fatal. Surely it is more prudent to bestow two or three minutes more on the work, in order to ensure more complete crushing, so that the débris may be removed by a tube of 14, 15 or 16 English diameter, than to crush coarsely and use an evacuator which infallibly inflicts serious mischief in a certain proportion of cases.

I will briefly sum up our subject thus: Lithotrity completed at a single sitting is in experienced hands an operation unequalled in its safety for the patient.

It produces much less subsequent persisting irritation of the bladder than the operation by several sittings.

In order to perform it in the most efficient manner, no new instrument is required. No change in the construction of the lithotrite is desirable. Certain modifications in the aspirator have been made with advantage. Instruments require to be increased in size and strength, only when calculi of increased size or unusual hardness have to be dealt with.

The value of the proceeding lies altogether in the removal of all the foreign matter from the bladder at one sitting, so that nothing remains to excite inflammation in an organ necessarily irritated by the operation. And the less irritating the operation has been, as a general rule to which there are exceptions, the more certain and more speedy will be the recovery.

It should be employed by beginners only for calculi of moderate size when hard. If calculi are large as well as hard, a young surgeon will probably proceed more safely by suprapubic lithotomy. In friable phosphatic calculi, size offers a much less serious difficulty. Lithotrity at a single sitting for a hard calculus upwards of an ounce in weight—and *à fortiori*, when double that weight—certainly demands an experienced operator.

I must briefly notice some contingencies which may be met with during the operation: and others which may occur afterwards. A manifest and very grave danger that an operator may incur, is the breaking or twisting of the blades of the lithotrite while it is engaged in crushing the stone. Such an accident may be fatal: it occurs from employing a

badly-constructed lithotrite, or from applying to a large and hard calculus an instrument too feeble for the resistance offered. In the latter case the error can only occur from lamentable want of judgment, or from incompetence on the part of the operator to adapt the means at his disposal to the object in view. The mere snapping of the beak of the male blade is not a serious accident; I have already referred to it in speaking of instruments; but any considerable distortion of the blades can only be the result of bad material or misapplied force. A considerable impaction with *débris* may sometimes occur in a flat-bladed lithotrite with insufficient opening to admit the dislodgment of *débris*, so as to prevent the two blades or jaws from approaching within a third or a half of an inch; or they may, very rarely, be blocked by a fragment into which the male blade has been driven, and owing to impaction cannot be made to pass through it. The latter is the most serious accident that has happened to myself; and it has occurred in a menacing form once only. I will tell you how it happened. Operating on an elderly man, some twelve years ago—at this moment, I am happy to say, alive and well at 81 years of age—I found my lithotrite, a flat-bladed one, immovably blocked with a fragment of uric-acid calculus, not large, so that I could neither get rid of the fragment, nor withdraw the instrument. In these circumstances, I accomplished what, to my knowledge, has not been precisely thus done before: I very slowly drew the instrument and its contents through the neck of the bladder and the prostatic urethra, which are remarkably dilatable if only time is given to the process, and steady traction is performed coolly and without hurry. Thus it came still further forward, and when the urethra ceased to yield any more, I pushed the testicles as far backwards as possible, and made a short incision in the median line of the penis towards its root down to the urethra, until I reached the lithotrite, the end of which was now exposed, and pushed completely through the opening into broad daylight. The *débris* which had been impacted and the fragment were now easily removed, the blades closed, the instrument was returned through the wound in the urethra, and withdrawn as usual by the external meatus. There was a little extravasation next day requiring one incision in the

scrotum ; all, however, soon healed ; the patient made a good recovery.

Bleeding as a result of the operation is very rarely troublesome, and usually subsides with rest. Internal styptics are useless ; the patient requires fair support by nutriment, and not to be interfered with by instruments unless absolutely necessary. (See Lecture XXXI.) Orchitis is not an unfrequent sequel of lithotrity, and should be treated in the usual manner. And sometimes the power of endurance in a feeble patient gives way after prolonged and severe cystitis, or he may succumb without any obvious cause, dying, as it is said, of 'exhaustion.'

Fever, as it is termed, implying almost invariably a more or less severe form of septicæmic infection, damages or destroys its victim occasionally after lithotrity ; the proportion of deaths, however, by this accident is very small. Phlebitis of the vesical veins has been known to occur, and to furnish deposits carried by the circulation to vital organs with fatal results. Happily this is a very rare occurrence in my experience ; but, like other operations, lithotrity is now and then followed by disasters of this kind.

I shall close this lecture by replying to a question which one of you put to me at our last meeting, since it is a very natural and pertinent one. I answer that, for the purpose of acquiring the practice necessary to qualify you to operate, there is no doubt some advantage in becoming familiar with the proper mode of handling a lithotrite by using it in the dead body. But you will find a great difference between the sensations communicated to your hand by the movements of the instrument and the stone in the living and in the dead body. The sensations in the latter case are simply those of a stone lying in obedience to gravity at the bottom of a flaccid bag, which has no life of its own, nor any power of movement, and is subject simply to mechanical laws. In such a cavity the foreign body is uniformly found at one place, and cannot be missed. Totally different is the sensation of encountering a similar body in a living bladder. By no means does the stone appear always to obey the force of gravity, and to lie at what you believe to be the bottom of the viscus. Sometimes, indeed, it seems strangely otherwise. The bladder has move-

ments of its own, which are doubtless aroused or called into activity by the unaccustomed disturbance occasioned by instruments; and the result of these at times is strangely to displace, as one must imagine, the calculus sought. This is one of the reasons why a stone is more readily and certainly seized when the lithotrite has been very quietly and easily introduced, without the disturbing influence of a preliminary injection—without, so to speak, awakening the resentment at intrusion (if I may use such a term) and the reflex contractions of the bladder so occasioned.

At our next meeting we shall take the subject of Lithotomy, and afterwards discuss the applicability of the two operations to the varied conditions and requirements of calculous patients.

LECTURE XX.

ON LITHOTOMY IN THE MALE SUBJECT BY OPERATIONS IN
THE PERINEUM.

GENTLEMEN,—We have already seen that the operation of Lithotrity is applicable to the great majority of calculous patients, but it will not suffice for all. We commence therefore to-day the study of Lithotomy.

The operation of 'cutting for the stone' has always been a subject of extreme interest; indeed, none has had in time past greater fascination for the veteran operator, while none perhaps has more excited the ambition of young surgeons. There is no achievement that an old student of the school, when revisiting it, is more content to announce to his former teacher, than the performance of this operation; and if he can say, 'I have just cut my first stone case with complete success,' he does but manifest legitimate pride, happy in the consciousness of newly-acquired power and well-earned reputation. On the other hand, the true surgeon who loves his art is always profoundly interested when the theme of discussion embraces either the history or the practice of lithotomy. And as I believe that some acquaintance with the former is one of the best ways of commencing a study of the latter, I will give you a slight sketch of this extensive subject (for its entire literature would suffice to stock a library)—that is, of the different stages by which the operative procedure now known as Lithotomy has arrived through earlier periods at its present condition.

The first description we possess of the operation of lithotomy appeared in the Augustan era, at which time it had already been performed some hundred of years, among the Greeks and Romans. I shall speak, therefore, first of lithotomy during the Classic period; although the operation then

described continued to be performed, as far as we know, throughout the Middle Ages. Secondly, I shall give a sketch of improved methods which arose with the revival of letters; and lastly, of the operations adopted during the last and present centuries, marked as this period is by disregard of ancient authority as the sole and sufficient guide in all matters which are determinable by experiment and observation. I dare say there was an earlier period than any of these, and some enterprising surgical antiquarian might find traces of a pre-historic period: because, wherever there are human remains, calculi must exist. I do not know how long uric-acid stones might be expected to endure. We know that the excreta of fishes have been preserved for many thousands of years, and I doubt not that some of these human excreta might be found also, and that oxalate-of-lime calculi, at least, must exist among other human remains. As so many observers are seeking the early records of the human race, I throw out the hint; and certainly, were I so searching, I should not forget to seek, among other things, the matters in question. Whether we shall thus ever find any instruments which could be identified as the means by which those stones may have been removed, is perhaps doubtful.

We will, however, not occupy our time with speculation, but will be satisfied to begin with such facts as we can find, say about 2,300 years ago. The first allusion on record is in the works of Hippocrates [born B.C. 460], who obliged his pupils to take an oath that they would never practise lithotomy, but leave the operation to those who were in the habit of performing it; thus indicating his sense, at all events, of the gravity of the proceeding, which he appeared to think too hazardous for men to undertake who were not specially trained for the purpose. To such he recommended that stone cases should be left; it is clear, therefore, that at this early period the operation was recognised as an established surgical procedure. But it was practised, not as any part of general surgical duty, but as an occupation by itself, and, as it would appear, in the estimation of physicians not a very exalted one. Indeed we know that the secret of the proceeding was, or was assumed to be, only in the hands of certain itinerant performers.

After this, Celsus, who probably flourished about the commencement of the Christian era, described the operation as it was practised by these men. In his seventh book he gives the details, and termed it 'cutting on the gripe.' The method was simple, and so were the instruments, on which account they came long afterwards to be termed the '*apparatus minor*,' to distinguish them from the '*apparatus major*' of another operation, which came into vogue in the second period. The ancient or classical method was thus conducted. The operator commenced by placing his patient, usually a boy, upon the knees of a man who was seated. If it was an adult patient (but such were rarely cut), two men sat side by side (their thighs forming the operating table), so that their arms might clasp the patient and control his struggles. The operator used no staff whatever, but inserted two or three fingers into the rectum, and endeavoured so to feel the stone, which he could only do when it was large. If he succeeded in recognising it, he firmly fixed, or 'griped' it with the ends of his fingers—hence the term 'cutting on the gripe;' and pressing it down towards the perineum, he made a semi-lunar cut with a broad scalpel until he reached it. Then, if unable to press it out with his fingers, he drew it out with a hook. Now, this very rough proceeding universally prevailed until about the sixteenth century; indeed, up to the seventeenth century it was largely practised in Europe. Even in the latter part of the seventeenth century, when Frère Jacques appeared, the ancient mode of cutting on the gripe was chiefly practised.

We now reach the second period, that of the Renaissance, when at least three different operations took their rise. Appropriately enough, too, a brother of one of those monastic orders which had cherished and exercised most of the arts hitherto, figures now as the most famous operator.

First, we will consider the '*Marian method*' or '*apparatus major*'—a median operation, originated by Johannes de Romanis, but receiving its name from his pupil, Marianus Sanctus, who published the first account of it A.D. 1524. It is called the '*apparatus major*' because, while 'cutting on the gripe' required only a knife and a hook, this small table would not be much too large to display the instruments employed for the Marian operation. They are not here, but

you may see most of them at the College Museum. By this method, a simple cylindrical staff having been introduced into the bladder, a vertical incision was made by the side of the raphé, and the urethra was opened on the staff at about the membranous portion. A dilator was then passed into the wound, and upon that another (male and female dilators they were called), and the canal and the neck of the bladder were torn asunder with great rudeness. Its only resemblance to the present median operation is, that the line of incision is almost in the same place. But the proceeding was too rude and too roughly executed, long to be tolerated as a surgical operation. While the calculi extracted were generally larger than those which are dealt with now, the incision was small. Hence for the purpose of forcibly enlarging it, various instruments were devised, some of which are the types on which certain modern surgical instruments have been constructed for other purposes. The test of practice sufficed in the course of time to prove the Marian a hazardous operation, and it was gradually abandoned in consequence. Still it held its ground in places, and for certain cases, as late as to a part of the eighteenth century.

Next I shall name the high or suprapubic operation, which although regarded as first performed at the end of the sixteenth century, was only reduced to practical rule in the seventeenth, while it was scarcely employed until the eighteenth, since which time it has maintained an important position for calculi of large size to the present day. More than this I shall not say here, for owing to recent improvements made, and its increased applicability to calculous cases, I shall devote another lecture to full consideration of the subject. To-day we shall occupy ourselves solely with perineal lithotomy.

I now come to a new proceeding, which rudely shadowed forth our present lateral operation. It was performed on a staff, which was not grooved as now, but yet it roughly served as a guide into the bladder. The operator commenced by thrusting a long knife into the ischio-rectal fossa, so as to penetrate the bladder behind the prostate; and then cutting forward, he made the entire wound at one incision. Invented, as it was believed, by Pierre Franco (about the middle of the sixteenth century), its apostle and promulgator was the cele-

brated Frère Jacques, who flourished in the latter part of the seventeenth century, and is said to have cut 5,000 times for stone. It is very probable that he did not cut 500; but an error of a cipher more or less was a trifle for the inexact and credulous mind of the period. Like others of his craft he was an itinerant operator, not at first embarrassed with too much knowledge of anatomy, although later in life he studied it seriously in Paris; after which, it is said, his operations were less successful. He then pursued his practice mainly in France; and subsequently a similar operation was performed by Rau, in Holland, who obtained much celebrity there. Some operators, however, had by this time adopted an incision commenced by the side of the raphé and carried down to the staff, where the opening was continued deeply towards the neck of the bladder. A near approach to the modern lateral method was thus indicated.

It will be interesting to you to know what was going on meantime in our own country. Most patients, up to the end of the seventeenth century, who were cut, submitted either to the old operation 'on the gripe,' or to the 'Marian.' In the beginning of the eighteenth century the suprapubic operation was first practised here. It was first brought into notice and successfully practised mainly by the influence and example of John Douglas, of the Westminster Hospital. At this period there came to London a Leicestershire lad, subsequently known as Cheselden, the celebrated surgeon of St. Thomas's Hospital; and he, soon after Douglas, performed and warmly advocated the high operation, writing an excellent work thereupon. But he had heard of the recent successes of Frère Jacques' method, and tried it, modifying it slightly as experience suggested, until he performed almost exactly what we now call the lateral operation, and with good results in young subjects. His success was so great, that in 1729, when he had performed the operation several years, and cut about one hundred patients—a very large majority of whom were children—Morand, the French surgeon, was sent from Paris to see him operate, and report upon the subject. He remained here for some time, Cheselden collecting a number of cases and operating on them before him. Morand then returned, and reported to the French

Academy so favourably on the subject that Cheselden's method became generally accepted there as the best. When operating on the adult, Cheselden made the deep incision, if possible, strictly within the limits of the prostate gland, and involving its left side only, using a scalpel of moderate size, and cutting inwards along the groove of the staff. A few years afterwards Cheselden retired, having cut 213 patients, of all ages, with ten deaths.¹ Those are the first figures that we can depend upon in connection with the operation, for, as I have told you before, the figures of the mediæval period are monstrous and incredible; for not only was the famous monk said to have cut 5,000, but to have lost 'scarcely any.' Cheselden, who had carefully studied and improved the method, and who, like Frère Jacques, operated on a few adults, but chiefly on children (whose cases you know are rarely fatal), met with barely five per cent. of deaths, which was a very successful result, and no doubt the best that had been yet made.²

¹ Of these 213 cases, no less than 105 were under 10 years of age, of whom 3 died; 62 were between 10 and 20 years of age, and of these 4 died; only 46 were above 20 years of age, and of these 3 died.—Cheselden's *Anatomy*, 5th edition, 1740, pp. 322–3.

² There is also a famous series of stone operations which is very frequently referred to as perhaps the most successful on record, performed by Martineau, of Norwich, and reported in the *Medical and Chirurgical Transactions*, vol. xi. p. 402, 1821. The number of patients was 84; amongst whom there were only 2 deaths. The operation was, of course, in all, lithotomy. They occurred between 1804 and 1820 inclusive—a period of seventeen years.

On analysing these figures, it appears that here also a very large proportion were children, while 6 were females; deducting these latter, there remain 78 male cases, of which not less than 34 were under fifteen years of age, leaving only 44 adults. Of these 44 adults, no more than 11 were upwards of 60 years of age; only 24 were 50 years old and upwards, giving for the latter a mean age of $62\frac{1}{2}$ years; the two deaths occurred among them.

No error is more common than that of comparing lists of cases without noting this most important element of age. Death after lithotomy in children is notoriously infrequent; indeed, it is a result scarcely to be expected, unless under circumstances of some rarity. During middle life, also, lithotomy is a very successful operation; but at the age of sixty and upwards it is one of considerable risk if the stone is large. Hence, if in any series of cases the ages of the patients are not furnished, no inference can be drawn from the results reported. A mere statement of the number of patients operated on, with the proportion of recoveries and deaths, is absolutely valueless, and is often misleading. For comparison between these results and those of modern lithotritry see Lecture XXI. page 286, where in 112 cases of male *adults* (children being entirely excluded), with a mean age of $62\frac{1}{2}$ years, there were only three fatal cases, or a mortality of less than $2\frac{3}{4}$ per cent.

At this point the operation continued for some years until the end of the century, and then the 'gorget' came into fashion. A few years ago a patient was rarely cut without it; now, perhaps, some of you scarcely know what it is. Originally one of the directors used in the 'apparatus major,' its edges were sharpened for the purpose of making the deep incision through the prostate. This was the idea of Sir Cæsar Hawkins, whose name was affixed to it; but subsequently almost every surgeon had his own gorget, making it wider or narrower, or altering it in some fashion or another. A great deal of mystery has been made of this instrument, but it is simply a wide blunt or partially-cutting knife with a beak or probe-point at the end, which is carefully maintained in the groove of the staff. In employing the ordinary knife, if you require a deep incision, the blade must generally leave the staff a little. The object of the gorget is to ensure a definite section of the prostate and neck of the bladder, by using a blade of known width which slides along but does not leave the staff. Here is one which formerly belonged to Scarpa, the celebrated anatomist, and here are others which, having been used by many celebrated operators, have fallen into my hands, and they are leading types of the instrument.

In France at this time the lithotome caché of Frère Côme was much used, and with the same object in view, viz. of attaining certainty and precision in dividing the deeply-seated structures, especially the prostate. The practical difference between it and the gorget is, that in the latter the incision is made by pushing inwards a sharp blade of known width through them; and that in the former a sharp blade is opened to a known extent at the farthest limit of the parts to be cut, and is drawn outwards to the operator, thus dividing them.

In 1816, Dupuytren, of Paris, not being content with the lateral, introduced his bilateral operation. His object was to make the deep incision by a cut on each side of the prostate, instead of a large one on the left side only. And he, with the same view of limiting accurately the extent of the wound, designed a special instrument for the purpose. This, the 'two-bladed lithotome,' is also a member of the ancient surgical armamentarium, made more elegant and manageable by modern skill. Here again, instead of making the internal

incision by pushing a cutting blade inwards, as with the knife or gorget, you carry this instrument [showing it] into the bladder along the staff, there open its two concealed blades, and drawing it towards you, these cut their way outwards. The blades can be arranged so as to have the incision as wide or as narrow as you please.

About 1825-1830, the 'median operation,' often loosely spoken of as a revived Marian operation, came into some note in this country, while in Italy it had been long previously employed with much success. In the meantime Civiale, in Paris, combined the median and bilateral operations in one proceeding, which he called the medio-bilateral; and you have seen me frequently perform both of them here; they shall be briefly described hereafter. Subsequently Nélaton devised an operation to which he gave the name of 'pre-rectal.' This may be fairly described as a bilateral operation, conducted by means of a carefully made dissection for the purpose of obtaining more space between the rectum and the bulb of the urethra, and especially to avoid wounding the latter. Following this, the late M. Dolbeau, of Paris, adopted a method, by no means before untried, of making a median perineal opening into the prostatic urethra, which he dilated by expanding metallic dilators, crushing the stone through it, and removing all the débris at one operation. It has generally proved to be a tedious proceeding, requiring much instrumental contact with the bladder after all the urine has escaped; and it is therefore somewhat hazardous for large stones, while it is quite unnecessary for small ones.

I now come to the mode of performing the lateral operation; that method which, during a great part of the present century, and until very recently, has been most trusted and most practised by the surgeons of Europe and America at the present day. As I have said before, when we have to do with many details, let us try to revert to first principles, and define clearly the object we aim at.

I told you that the object of lithotrity is to remove the stone without injury to the patient, either from the stone or the instrument. In lithotomy there must be a wound, and the object is to make it, when situate in the perineum, so that it shall least endanger the blood-vessels, the rectum, and the

neck of the bladder ; next, to remove the stone through the opening thus made with as little mischief as possible to any of those parts. When that problem is best solved, we shall have the best form of perineal lithotomy. It is still open to discussion whether we have yet found out the best way, although we have been 2,500 years—to say nothing of the pre-historic period—in coming to our present position.

Now, in order to aid you to solve the problem for yourselves, I have placed before you a diagram drawn accurately from the preparation, showing the bones and ligaments of the pelvis, in the position required for the performance of the operation (fig. 76). The lower outlet is opposite to us ; it

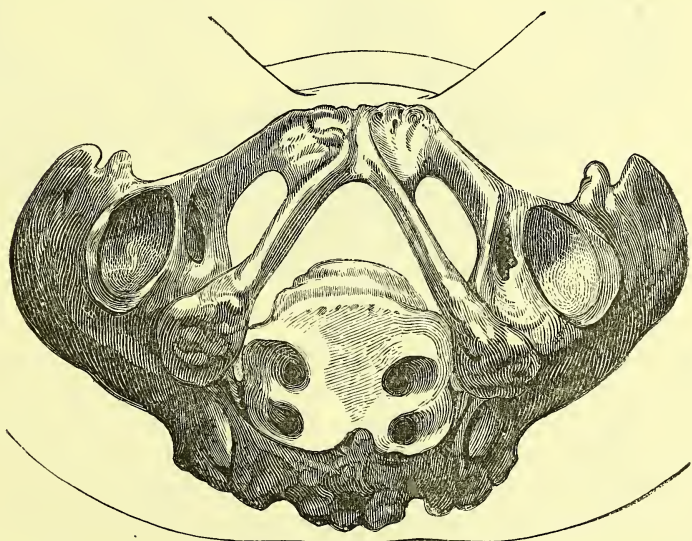


FIG. 76.—Bones and ligaments of the pelvis in the position for lithotomy.

is in the subject filled by soft parts, and it forms the opening into which you have to cut, and through which you must remove the stone ; indeed, all that is done here must, of course, be limited by its boundaries of bone. I like to have that outlet and its contents in my mind's eye when the patient is tied up, and I take my seat to operate. Following this is a diagram showing the deep dissection of the soft parts which fill the opening or space (fig. 77). You are doubtless too well acquainted with the anatomy of this region to require

any detailed account here of the important structures involved in the operation. I shall simply mention those which concern us. First is to be named the pudic artery, safely sheltered

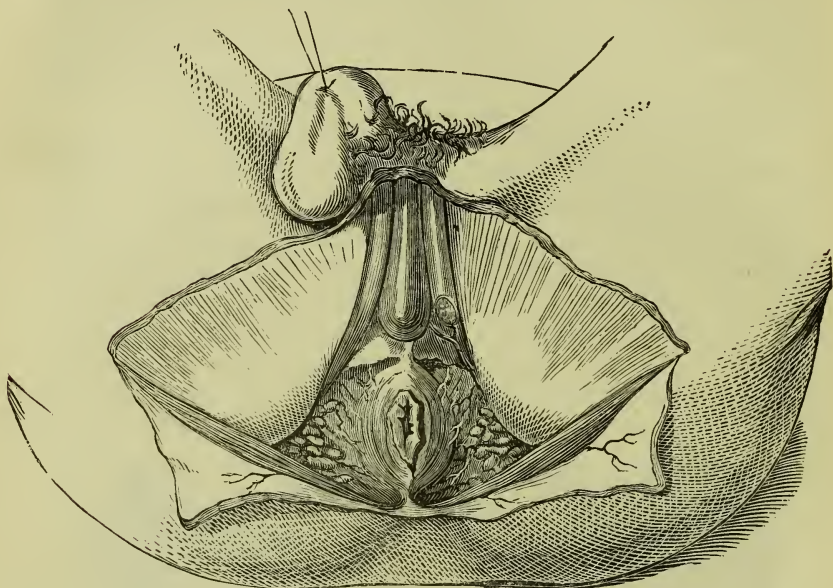


FIG. 77.—Dissection, showing the bulb.

under the pubic ramus on your right; but it gives a branch to the bulb, a vessel to be avoided at the upper part of the space. Then vertically placed in the middle line is the bulb of the urethra, not to be lightly regarded; indeed, it may be the source of considerable danger, being a vascular structure, which communicates freely with the vessel named, and a deep incision into it is as bad as cutting the vessel itself, if not worse. Next, there is the rectum in the middle and lower part, which it is also important to avoid. Deeper in, just beyond and below the bulb, is the prostate, which must be partially divided in the deep incision.

I will now very briefly touch on the principal steps of the operation. A mild aperient has probably been taken the day before, and has acted moderately; and about two hours previous to operating an enema of warm water should be given to empty the lower bowel. Care should be taken that its action is completed before the patient comes to the table,

where I have seen the result occur, much to the annoyance and sometimes embarrassment of those concerned. There need be no anxiety about the state of the bladder; nothing is gained by its being full of urine, although some have thought this condition highly desirable. Cheselden, on the other hand, preferred it to be empty, saying that the stone was then generally found close to the neck of the bladder. I have seen great pains taken to inject the bladder before operating: but the unconscious patient has usually succeeded in emptying it, in spite of tying the penis, and of similar precautions.

The patient being placed on the table, ether is to be administered; but before tying him in position, the operator should pass a full-sized staff with a deep groove (fig. 78) into

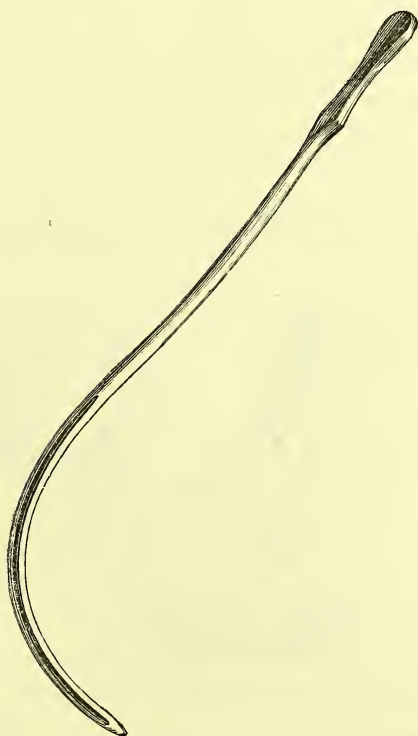


FIG. 78.—T staff.

the bladder, and with it find and strike the stone. Never consent to operate on a man if you are not fully satisfied that

the staff on which you propose to cut is in contact with the stone; although you may have sounded the day before, and are morally certain it is in the bladder. Frightful blunders have been made through indifference to this rule. Suppose, for example, that the staff has, without any suspicion on your part, passed, not into the bladder, but into some old false passage; a by no means impossible occurrence! One cannot but shudder at the prospects of an operation performed on it when so placed—yet this condition must sometimes be encountered, unless the rule laid down is rigidly adhered to. The result can rarely be otherwise than distressing to all concerned, calamitous to the operator, and probably fatal to the patient. A distinctly audible note of contact between the stone and the staff is to be clear to yourself, and, at least, to one other of those who are present. After this the staff itself is to be entrusted to the hand of your best friend, who is to attend implicitly to your instructions, whatever they may be. The patient is then to be tied up firmly, each hand to the corresponding foot; but this is better done by the leather anklets and wristbands (fig. 79), devised by Mr. Prichard, of Bristol, because they truly realise the proverb, ‘fast bind, safe find,’ which our old friends ‘the garters’ often did not.

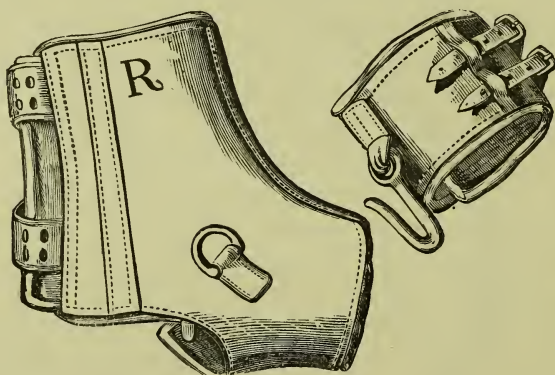


FIG. 79.—Lithotomy anklet and wrist-piece.

There is, moreover, ‘the yoke,’ which accomplishes equally well, and perhaps, on the whole, more easily, the same object, especially if there are but few assistants (fig. 80).

Now, what are the instructions to your friend, the holder

of the staff? You want it held firmly, and, before all things, that it should not leave the bladder. I don't think you gain much by cultivating a fancy for any particular spot, such as

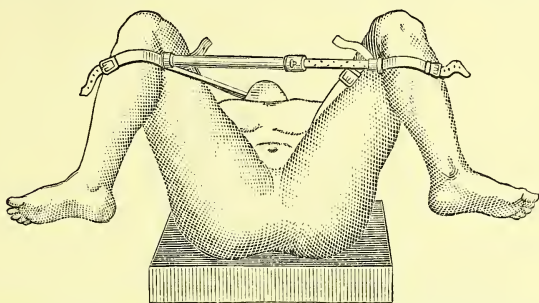


FIG. 80.—The 'yoke' for securing a patient in the position for lateral lithotomy.

right or left, or projecting in the perineum. If it is to be steady, always in one place, which is the main thing, there must be a point of support for it to rest against, and there is but one such spot in the whole region. Rely upon it, then, you had better tell him to keep it close to the arch of the pubes, well hooked up, with the handle pretty nearly vertical. And he is to be mindful not to depress the handle so as to carry the point of the staff up to the top of an empty bladder, or through it, as I have known thus to be done! Now take your seat at an easy distance, facing the perineum of the patient, whose buttocks should be brought forward until they slightly overlap the margin of the table; an assistant holding a foot and knee on either side, and taking care that they are symmetrically placed and range in one plane before the operator. This done, your arm, when extended horizontally, should be on a level with the centre of the perineum, which region you are to traverse with the fingers of both hands, finding the lines of the rami; then introduce the left index into the rectum, to verify the condition of the bowel, whether it is empty or the reverse, noting also the size and situation of the prostate.

Now, relative to the first incision, different authorities advise different places at which to enter the scalpel and commence it. Without discussing these, let me say that, as a rule, the usual point should be, for an adult, about an inch

and a half in front of the centre of the anus, a third of an inch to the left side (patient's left) of the raphé. Having placed the fingers of the left hand on the upper part and right side (patient's right) of the perineum to steady the skin, prepare to make a somewhat oblique incision about two and a half or three inches long, according to circumstances. The more there is of fat, and the deeper is the perineum, the more need is there for an extended first incision. Holding the knife horizontally, enter it boldly at the point named, and direct it as you descend to the centre of the incision, deeply into the tissues so as to approach without attempting to reach the staff: then gradually, cutting less deeply, let the incision terminate not far from the margin of the tuber ischii. You may sometimes even touch the staff in that first incision, although this is by no means necessary; but it saves some trouble and uncertainty to approach it nearly, which you should always do; for a timid shallow cut which merely divides the skin leaves a young operator sometimes uncertain as to his route to the staff. Then introduce the left index finger into the wound, and separate the cellular connections, when the line of the staff should be felt beneath them; and a touch or two with the point of the knife should bring your finger almost or quite into contact. Fix your finger-nail on the inner edge of the groove tolerably far back, so as to avoid the bulb as much as possible; and at the same time guard the rectum with the body of the finger. Slide the point of the knife along your nail into the groove, and enter it firmly, feeling that you divide the tissues and have unmistakable contact between the point of the blade and the metal of the staff (fig. 81). Then run the point firmly and steadily on in contact with the staff, so as to divide a portion of the prostate. Keep the point up, and always in the groove, and you will be safe; let it down, and you may slip out and get it into the rectum, or elsewhere. Simply go on, letting the blade be more horizontal as it proceeds until the point has just entered the bladder, still not letting the knife leave the staff. The depth of the incision will depend upon the angle which the knife makes with the staff as it passes through the prostate: if the knife is maintained close to or parallel with the staff, of course you will only make a wound the width of the knife;

but if the angle between it and the staff is increased, the width of the incision will be increased also. Finally, withdraw the knife without adding to the wound, unless you see reason to

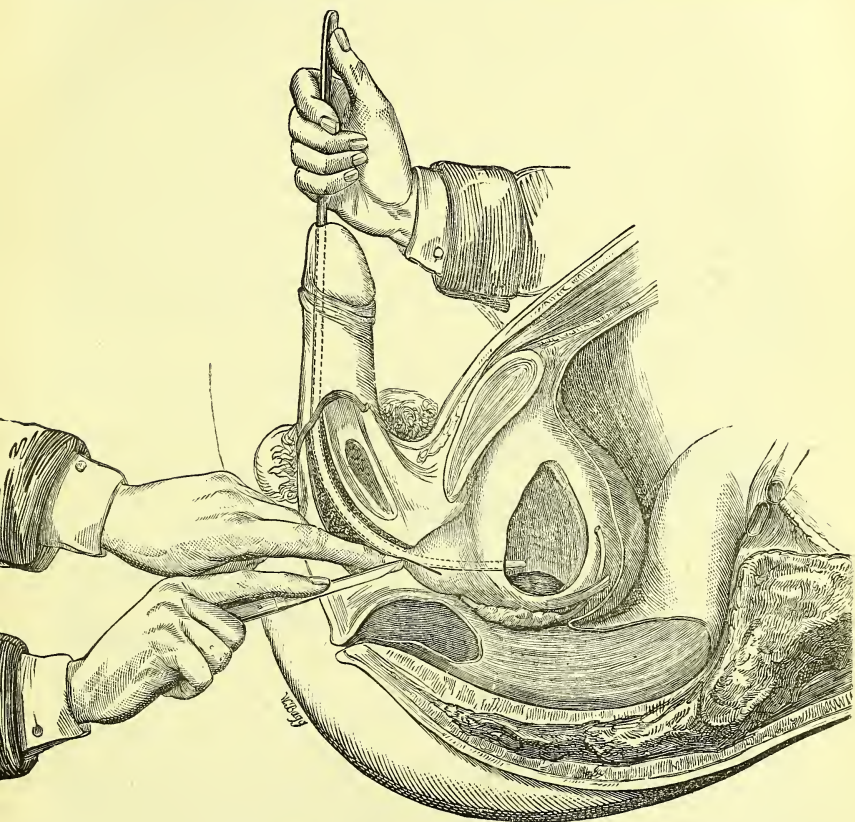


FIG. 81.—The incision through the prostate.

do so, in which case, if the edge is directed outwards and downwards against the soft parts, with a light hand, as you come out, you will make a freer and cleaner opening. It is better to be rather free in cutting than otherwise [the presence of a large stone is assumed], but you must not make the incision too wide.

There has been a great deal of good advice expended upon this subject—the extent of the deep incision—but it is manifestly impossible for one man to make another understand exactly what he means or what he does by the use of general

terms, and precise expression on such a subject is impossible. My belief, however, is that the practical result of our anxious care about this matter is, that we are apt to cut rather too little than too much, and that the neck of the bladder, in consequence, receives severer injury from the stone and forceps than would be the case were the prostate freely divided by the knife. This observation relates, of course, to adults; for in children you can scarcely find the prostate—it weighs but a few grains, and does not require a moment's consideration, in regard to incision, for the knife goes beyond its limits; yet these little patients are the safest to cut. Of course there is an essential difference in susceptibility to danger at the two ages, due to the widely differing conditions of life after puberty and during childhood.

To return. The incision being completed, your left index

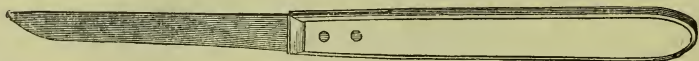


FIG. 82.—The lithotomy knife.

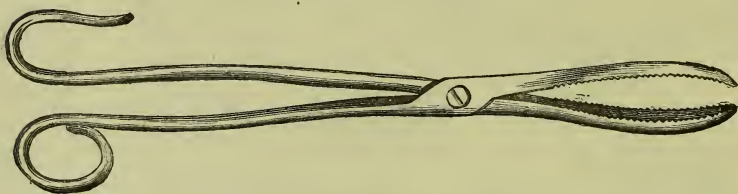


FIG. 83.—The lithotomy forceps.

finger immediately follows close along the staff into the bladder, where you will probably just touch the stone. Order then your assistant to withdraw the staff. The finger goes firmly and deeply in, stopping the urine perhaps, to some extent, in its outflow, and accomplishes the first dilatation of the parts. Then you slide the forceps closely along the palmar surface of the finger, and insinuate them over it into the bladder, which makes dilatation number two. Then taking lightly and delicately one handle in either hand, you have, as a rule, but to open the instrument carefully, yet widely, one blade flat at the bottom of the bladder, the other towards the top, on closing the blades, to find the stone between them. If it seems that you have a good hold, draw gradually outwards and downwards, easing or adjusting, if you can, with the left

index, so that the long axis of the stone may correspond with the long axis of the blades, which it is by no means always possible to accomplish ; and so you make the third and last dilatation. Remember that you are not to pull out horizontally and bruise the soft parts against the pubic arch, but downwards into the widest part of the lower pelvic aperture. And don't be hurried for the sake of anybody else in order to make a rapid operation. You and your patient are to be, for you, at this moment, the only persons present, and your responsibility to him must never be forgotten for an instant through any influence of bystanders and lookers-on.

But we sometimes meet with a very stout patient, or one who has a very large prostate, and the consequence is that the finger will not quite reach and enter the neck of the bladder. In this condition, after making the deep incision, I



FIG. 84.—The blunted gorget.

pass carefully along the groove of the staff the blunted gorget (fig. 84)—the narrower side towards the median line—until it enters the bladder, and on this I slide in the forceps, directing the staff to be withdrawn. Feeling my forceps free within the cavity of the bladder, I remove the gorget and seek the stone as just directed. In rare cases the gorget is thus a very useful instrument, but it should not have a cutting edge ; a thin edge, but blunt, is the best.

Your next duty is to introduce by the wound an ordinary sound, and ascertain whether there is another stone ; or, better still, introduce your finger as far through the neck of the bladder as you can, and make pressure above and behind the pubic symphysis with the right hand, which will often enable you to explore the cavity thoroughly. Of course the patient must be sufficiently under the influence of the anæsthetic to ensure flexibility of the recti muscles. If, however, the hæmorrhage is free, and any considerable vessel is spouting

within view, it is, of course first to be tied. Severe hæmorrhage always demands instant attention; it is sometimes considerable, and no pains should be spared to arrest it by the ligature if possible. Sometimes the point of a well-curved tenaculum may be carried under an arterial jet high up, which you have failed to tie. Pulling the instrument gently towards you, a ligature may be made to encircle the tissue laid hold of, and then the tenaculum may be left in place. I have one from which the handle may be removed by unscrewing, made expressly for this purpose, and it has been a very useful aid on two or three occasions (fig. 85). Subsequently

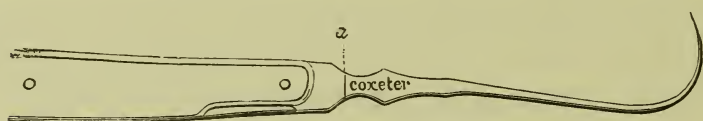


FIG. 85.—The tenaculum, which unscrews near the handle.

inject a large syringeful or two of cold water through a long bulbous-ended tube into the bladder, from which it returns in a current; and place a gum-elastic tube in the wound if the oozing of blood is rather free. The tube is provided with a kind of 'petticoat' of thin cotton material round it, into which you can tightly squeeze some strips of lint, and so make pressure on the bleeding surface (fig. 86). The tube may be removed in forty-eight hours or so, taking out first the lint, little by little, and finally the tube itself. If there is only slight bleeding, I prefer to have no foreign body in the wound, and no dressing of any kind. But the most certain mode of dealing with severe bleeding, the ligature failing or being insufficient, is the addition of an inflatable thin indiarubber bag to the tube, so arranged around it that, while its draining action is left intact, the bag can be distended with air, through a small flexible tube provided with a stopcock (see fig. 87). It should be introduced so far that the whole cut surface is exposed to the action of the bag; indeed, the farther end of this should just protrude slightly into the bladder itself. This done, and inflation being made, the distended bag produces pressure on every portion of the wound's surface, closing every inequality, and effectually stopping all the hæmorrhage. After twelve or twenty-four hours or so, a little air is allowed to

escape and the pressure is gradually relaxed, until the apparatus can be removed altogether. It was designed by my friend, Mr. Buckston Browne, and is known as the 'dilatable air tampon.' It is, in my opinion, the most efficient means we have to control bleeding after lithotomy of any kind : no



FIG. 86.—The tube, with 'petticoat.'

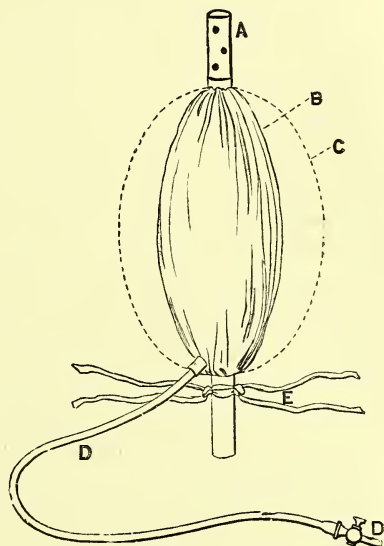


FIG. 87.—The air tampon. A. The tube. B. Thin india-rubber bag, undistended. C, line indicating form of bag when distended by air. D. Flexible tube, with stopcock for inflating bag. E. Tapes to fasten tube in place.

one certainly ought to perform that operation without one of these instruments at his side.

This matter settled, the patient should be carefully carried from the table to his bed, placed on his back, with one or two pillows under each ham, and the parts involved exposed to air and light, so that you can see how the urine flows. The less meddling afterwards generally the better. The severe pain which is usually felt for a few hours after should be mitigated by full doses of morphia or opium. I have sometimes put a suppository, containing one grain of the former, into the bowel of an adult patient before he leaves the operating table. A subcutaneous injection, however, is preferable.

I have only time to say a word or two about the median and medio-bilateral operations. For the median, an incision is made in the line of the raphé from about two inches and a half above the anus, downwards as near to its margin as is safe, for you want all the space you can get. Dissect down to the staff, with a finger in the rectum, which enables you to avoid it, and take care also to incise the bulb of the corpus spongiosum as little as possible. Then open the urethra with a long straight-pointed bistoury in the membranous portion or thereabout, and carry a director on into the bladder: your finger follows and dilates, and then the forceps is to be introduced on that. The operation is sometimes performed by thrusting the straight bistoury, with its back downwards, in front of the anus, into the staff, and cutting upwards and outwards at one incision. I prefer the other mode. Manifestly this operation will not do for very large stones, which, thanks to lithotrity, are those chiefly which have to be provided for by lithotomy. Hence the applicability of the 'median' may be somewhat extended, by making it 'medio-bilateral,' and in this manner: Having performed the median, as just described, up to the point of opening the urethra, instead of employing a director, the two-bladed lithotome is introduced, and when it is in the bladder the blades are opened, and two moderate incisions are made, one right, the other left, as the opened instrument is drawn outwards in the groove of the staff. A larger opening is, of course, ensured in this manner than by the simple longitudinal incision, and a somewhat larger stone can thus be removed.

These two operations I have performed about thirty times, and I do not know that there is any reason for preferring them to the 'lateral.' To make an accurate estimate, at least 100 cases of each operation by the same hand are required. Nevertheless, I may say a word on the principle which essentially distinguishes these operations. They owe their existence to the result of opposite convictions respecting the hazard of the knife. There has always been found a class of men to whom anatomical knowledge is a source of embarrassment when operating, who are more or less influenced by the fear of dividing some important structure, and who hesitate to cut as much as is really necessary. There is another

class of men who are less disturbed by such considerations, less fearful—mind, I do not say less cautious—who regard the larger and freer style of operating as better than the small or timid style. All surgeons, of course, tend more or less to fall into one of these two classes. The anatomical school have devised varieties of the median operation in order to avoid certain blood-vessels, &c., and they sacrifice space in doing so. The method answers exceedingly well for small and medium-sized stones; but these are, or should be, removed by crushing now, and we do not want any cutting operation for such stones. The perineal operation, which offers the most room, the recto-vesical excepted, is the lateral operation. All the others named are essentially median operations. Now I am bound to say, that formerly, judging theoretically, I had a leaning to median methods, being disposed to think that they would be attended with less hæmorrhage than the others. But I do not find this so in practice, and I have arrived at the conclusion that there is quite as much bleeding in median as in lateral operations. I attribute this to incision of the bulb, which I regard, to all intents and purposes, as a large artery. You cut into that spongy tissue—not in all cases, but in some—and there is as much bleeding as if you had cut the artery of the bulb, and there is more difficulty in controlling the flow. The bulb is likely to be cut more or less in the median operation. The problem is how to reach the bladder without wounding the bulb, its artery, and the rectum; and I believe that a well-performed lateral operation more nearly attains that object, where a free opening for a large stone is required, than any other.

I cannot tell you which of these two operations is the easier of performance; if anything, perhaps the lateral. But here is the important fact, which is only beginning to be realised by the profession—viz. that the exceptional cases of very large stone in the adult alone require any cutting operation, since all the small and middle-sized and even large ones can be much more safely removed by the crushing process. And it is this fact, the demonstration of which is of comparatively recent date, that is bringing the various forms of perineal lithotomy under the serious consideration of surgeons at the present day from a new and different point of view. It

will not be very long probably before all forms of them will, for adults at all events, be laid aside for a safer and easier route above the pubes.

The operation of lateral lithotomy is less easy of performance for children than for adults: on the other hand, it is very rarely fatal, and these small patients usually recover rapidly. It is more difficult, because the staff must be small, especially for a boy of two or three years; the tissues are soft and delicate, and the outlet of the pelvis is very limited in size.

The points to be attended to are as follows: First, let your knife, the blade of which must be narrow in proportion to the size of the patient, have a keen point and edge; a blunt knife will push its way without accurately dividing the tender yielding tissues before it, which it is essential that it should do. Secondly, having made an opening into the urethra, and assured yourself that the staff is well exposed, place the point of a small and somewhat tapering gorget clearly in the groove of the staff and push it along the groove into the bladder. If you attempt to use your left index finger for this purpose, as in the operation on the adult, you may, instead of entering the urethra, push before you the prostate and bladder *en masse*, separating them from the urethra, into which the point of your finger is too large and blunt to be easily insinuated. Such an occurrence is highly dangerous, and may prevent your reaching and extracting the stone. Having then safely introduced the gorget, let the staff be withdrawn, and on the gorget introduce a pair of small forceps, rather upwards behind the pubic symphysis, remembering that the child's bladder lies more in that direction than the bladder of the adult does. Take care to remember also how small the space and distance are in which you have to work. The division of the prostate gland is not a matter of concern; it is so rudimentary in children that the incision necessarily passes beyond its limits, and in doing so produces no evil result. No tube is required in the wound afterwards.

The median operation may be employed for children also, and is to be performed with the gorget in the same way. I have done both, and have very little preference for one over the other. But the suprapubic operation, if the stone is

large, is perhaps, in these cases also, the easiest, the safest, and in every way the most suitable. This will be considered fully hereafter.

In the preliminary sounding of a child, be perfectly certain, and let a professional friend be satisfied too, that a stone is present before you decide on operating. It is not difficult to strike the wall of the pelvis from the interior of a child's bladder, and to produce an audible note—such has often been mistaken for calculus. It has happened by no means unfrequently that a child has been cut for stone, and none has been found when the bladder has been explored.

LECTURE XXI.

THE SELECTION OF CASES FOR LITHOTRITY AND LITHOTOMY
—THE MORTALITY FOLLOWING THESE OPERATIONS—CALCULUS
IN WOMEN.

GENTLEMEN,—It has been my object in the last two lectures to lay down the principles, and also as far as possible to illustrate the practice to be followed in operating for stone, by the two methods of crushing it in the bladder, and of cutting to remove it entire.

We must now inquire what are the circumstances which should determine our choice of either of these widely different courses of action, for the varied cases which come before us. I need hardly say calculous subjects differ greatly in many particulars necessary to be considered in coming to a decision on this matter. In relation to the individual patient, the sex, age, presence or absence of diseased or abnormal conditions of the urinary organs themselves, or in other organs more or less closely related to them, and the state of the general health, must influence and guide the surgeon's judgment in making his selection.

Then the physical and chemical characters of the stone itself have in many cases to be taken into account.

I may remark that attention to these facts was far less necessary when there was but one operation—namely, that of cutting. Formerly, whether the stone was large or small, the patient was always cut. Now that we have two operations, it is important that we should choose the most appropriate one; because—and let me impress on you the importance of the fact—if you do not select that which is best suited to the case, you may do more harm than if you cut every patient who comes to you. Thus, if you crush the very large stone, and cut for the very small one, a greater mortality may

result than if you simply resorted to the one operation of cutting in all cases. When lithotrity was first introduced, it was a far less efficient operation than it now is; and when the cases were not judiciously selected, when surgeons operated without making a diagnosis respecting the points I have enumerated—attempting to crush stones that were much too large for the process, and cutting for stones which might have been crushed—the entire mortality resulting from operations for stone actually became greater for a time than it had been previously, when every case was cut. I cannot give you a more pertinent illustration of the necessity of choosing the operation judiciously for each case.

Speaking then in general terms, I will indicate as briefly as I can those directions which my experience up to the most recent date enables me to offer as a guide to you on this subject.

I should say that most of the patients under puberty might safely be cut by the median or lateral, or by the suprapubic method according to the size of the stone. For it is well known that lithotomy is a very successful operation in their cases—far more so than it is in those of adults. Not more than one death in fifteen or sixteen cases occurs from lateral lithotomy in children. In situations moreover where men are not provided with tolerably complete sets of lithotrity instruments adapted for the small passages of children, and are perhaps not experienced in the practice of crushing, I do not hesitate to say there is no question about the matter; it will be safer to use the knife. But no one need doubt, granted the possession of small but exceedingly well-made lithotrites—perfection of construction being necessary in an inverse ratio to size—suitable evacuators, &c., that calculi of considerable weight may be safely removed by a practised hand at one sitting under ether, at almost any age below puberty as well as above. In any case when the calculus is no bigger than, say, a large bean, it should be crushed and removed at a sitting, for which purpose one suitable lithotrite will suffice. In the absence of such an instrument, with its attendant aspirator, &c., the task is by no means easy or safe.

But as a general rule, when the patient is small, and the stone is relatively large, I advise you without hesitation to

adopt the suprapubic operation. It is exceedingly simple, easy to perform, attended with little risk, and divides no important structure like those which are more or less endangered by any route through the perineum. Then the bladder of the child is partially an abdominal organ, more conveniently placed for access than that of the adult.

We have therefore now remaining for consideration all the cases above puberty; and here lithotomy is only exceptionally available. To facilitate our consideration of the subject, I will state, in general terms, that the cases of stone occurring in patients who have passed the age of puberty are to be operated on by lithotrity, with but few exceptions.

The first exception, and the most important, is presented by extreme size and hardness in the stone. It is difficult to say what shall be the size which, together with hardness, shall be accepted as determining the nature of the operation to be selected. Indeed, in the nature of things, there can be no hard and fast line drawn which shall be made applicable to all cases. Even the experience and other personal qualifications of the surgeon himself must tell for something, in certain circumstances, in deciding this question. One surgeon may be more competent to deal with a stone above average weight by crushing, than another who more safely and skillfully uses the knife. Granting then some exceptional practice on this ground, it may be said that any uric-acid calculus weighing an ounce, with a urethra of average size, ought to be crushed, while one or two ounces is quite within the limit of a careful and somewhat practised operator. Still larger examples may be safely undertaken, in favourable circumstances. An oxalate-of-lime calculus weighing less than an ounce may be regarded as the full equivalent of a uric-acid weighing two. Phosphatic calculi of much larger size may be readily dealt with if time and patience are devoted to the task.

But in most hands, for uric-acid formations of two ounces, and oxalate of lime over three-quarters of an ounce, I believe the suprapubic operation to be equally safe for its immediate result, and generally preferable for the future condition of the patient. For calculi of three ounces and upwards it

should be resorted to without hesitation. We shall examine the subject further at our next lecture.

The remaining exceptions are morbid conditions affecting some part of the urinary organs of the calculous patient, which are held to contra-indicate lithotrity. These are very few indeed. Formerly very slight changes or defects in them were accepted as valid reasons for adopting the knife. I believe it fell to my lot at a very early period to demonstrate that there was no warrant for making such exceptions. On the contrary, I was able to prove that, notwithstanding the presence of such defects, lithotrity was very generally a much safer operation than lateral lithotomy, at that time the usual alternative.

In considering the question thus raised, I will name, first, certain diseased conditions which you need not necessarily regard as disqualifying the patient for lithotrity, although held to do so by some authors, and perhaps I may say, many of the profession still.

In presence of stricture of the urethra it was commonly said that lithotrity is of course impossible. Also, that in marked enlargement of the prostate it is difficult and undesirable. That if the bladder is very irritable—that is, if the calls to pass water are exceedingly frequent and painful—lithotrity is a most unpromising operation. That in any severe disease of the bladder it is out of the question; and finally, that in disease of the kidneys it is more dangerous than lithotomy.

I reply first, in relation to stricture of the urethra, that our ability to crush a stone is thereby to some extent limited, but that in most instances the obstruction presents no great, much less insuperable, difficulty. In two cases occurring in the wards here, in which the narrowing was considerable and obstinate, I crushed the calculus, not a small one in either case, by the following method. The patient was first treated by ‘continuous dilatation,’ that is to say, commencing with a catheter, number three or four, which was tied in and replaced by a larger, dilatation was carried in a few days to number ten. Then under ether a conical dilator or two opened the stricture still further, so that there was ample room for the lithotrite. This was repeated at a second, and again at a third sitting, leaving a full-sized catheter in the bladder

after each sitting. Now that the bladder is emptied at one sitting, I use a series of dilators at the outset, or, if the stricture is narrow and confirmed, I do a complete internal urethrotomy, so that I have room at once for a large evacuator, and the stricture is efficiently treated and the stone removed at one sitting. This I have recently done with the most satisfactory result.

Secondly, in marked enlargement of the prostate, I make no difference whatever, and would as soon crush in the presence of this condition as in a younger patient without it. If a much-enlarged prostate occurs in a man who has had instruments passed, he will have become habituated to them, and is mostly, therefore, a better subject than a healthy one who has not been so accustomed. If he passes no urine by his own efforts and requires very frequent catheterism, his case is one of somewhat increased hazard; and if he has severe cystitis, the condition may be serious. In this emergency, when the bladder is wholly unable to relieve itself by natural efforts, I have adopted two methods successfully: one is to remove the stone by lithotrity, and to introduce a tube into the bladder by a small opening above the pubes, in the manner described in Lecture XII.; the other, is to make a small perineal opening into the membranous urethra, and tie a large English gum catheter in the bladder through the perineal wound, which gives the patient little or no inconvenience, and saves all the frequent and painful catheterism which had previously been necessary, lithotrity being first performed of course as in the preceding instance. And I think that the former method is generally, although not invariably, the better of the two when this kind of relief is necessary.

Thirdly, in relation to the bladder which is merely atonied, and unable to void its contents by its own power, all the urine being drawn off by means of a catheter: lithotrity is often preferable in this case also, and for the reason just assigned—that is, the bladder and the urethra are habituated to instruments.

Fourthly, irritability or extreme sensibility of the bladder is not an insuperable objection. It used to be said that if the bladder could not hold above three or four ounces of urine, there would be no room for the lithotrite to work satisfactorily,

and that lithotomy should then be preferred. But great irritability is chiefly due to the presence of the stone; and as soon as it is removed the irritation almost invariably disappears. Besides, it is not necessary to have four ounces of water in the bladder; one ounce is ample. The presence of five ounces was thought necessary with the large and clumsy lithotrites of former days, but with proper instruments the bladder even when empty is scarcely in any danger. When the instruments used were liable to lay hold of the coats of the bladder, a quantity of water in its cavity was a desirable protection; but a well-made lithotrite will not injure the bladder, and with such an instrument there is no difficulty whatever in crushing with a single ounce of water or even when it is quite empty. It is certainly not desirable to have six or eight ounces, since a large quantity of fluid is always embarrassing: currents are produced by the lithotrite, which keep the stone or the fragments in movement, rolling anywhere rather than between the grasp of the instrument, so that seizing them with the lithotrite is rather a game of chance than of skill. In connection with this subject it is desirable to remember the unquestionable fact that young and healthy patients, say those between 30 and 45 years, are much more liable to inflammation and to continued irritation after crushing than those of 60 years and upwards.

Fifthly, as to advanced disease of the bladder, each case must be dealt with according to its particular merits. In cases of notable tumour of the bladder, complicated with calculus, which are very rare, the propriety of any operation must be doubtful. I once in this hospital greatly mitigated, for the few weeks he had to live, the sufferings of a poor fellow with cancer in the bladder, by crushing a phosphatic calculus. No one certainly could ever have dreamed of submitting him to a cutting operation for the purpose.

Sixthly, as to the comparative applicability of the two operations in the presence of the various forms of renal disease—a very large subject—I must defer the consideration of it to a separate lecture. (See Lecture XXIII.) Suffice it to say here, that modern lithotritry will in most cases be safer than lithotomy. Some years ago the contrary decision would no doubt have been sometimes more judicious.

You see, then, that the exceptions are rare, and limited almost entirely to those cases which are difficult or hazardous, because the stone is unusually hard or large. Indeed, there are not many adult cases which cannot be advantageously treated by lithotrity, provided proper care and attention are afforded. At all events, the great majority of calculi, omitting only the very large ones, must be regarded as removable by lithotrity, and with every prospect of success in the hands of a fairly experienced operator. If surgeons of the present generation now growing progress, as they must, and become more careful than those who have gone before—more alive to the great importance of finding the stone in its early stage, there will be fewer and fewer exceptions. For it is certainly true that if the stone is discovered before it is large, *it can always be crushed with an almost certain chance of success*; lithotomy, therefore, for adults must at some day disappear, except for those cases in which the symptoms have been greatly neglected by the patients themselves, or the presence of stone has been overlooked by the medical attendant.

A rather large uric-acid stone is the growth of several years; a large phosphatic stone is perhaps the growth of two or three years; an oxalate-of-lime weighing much more than an ounce, say of six to eight years; and it is very hard if, long before the expiration of such periods, the stone cannot be found and disposed of by lithotrity. It is certain, if a calculous patient has the benefit of intelligent oversight and treatment, that his stone will be always discovered at a period when it can be crushed with almost a certainty of success; so that the only cases in which lithotomy will have to be performed are those in which the patient has neglected himself, and although suffering severely for years, has not sought professional aid. But such cases must become, in the course of time, very few indeed.

I now ask your attention to a very important subject, viz., What is the death-rate following the operations we have been discussing when performed in the cases of men only?

And let me premise that it is absolutely essential to separate the cases of children from those of elderly adults when treating this matter. The different liability to fatal result from lithotomy at the different extremes of life is so great as

to render absolutely valueless any numerical statement respecting mortality affecting a series of patients whose ages are not reported.

Commencing then with the question of mortality in the cases of adults only, I must beg you to observe that they now become naturally divided into two classes for the purpose of treatment: a small class of patients who manifest some exceptional difficulty or unfortunate complication, and are therefore submitted to the knife; and a comparatively very large class of patients with much more hopeful prospects than the preceding, whose cases are amenable to lithotrity. You are entitled therefore to expect a triumphant success for the latter class, and to fear a considerable mortality among the former. When cutting was the only mode of treatment, its results in the hands of different operators could be compared, provided only that the numbers dealt with were sufficient; and this it must be confessed was very rarely the case. Unless the cases are very numerous as well as accurately reported, conclusions drawn therefrom are not merely valueless but are misleading. The two operations as now employed do not admit of being compared on parallel lines. They are no longer employed indifferently or in any sense as rival methods, and their respective merits and successes are not to be matched the one with the other. When lithotrity was first introduced, the lithotomist regarded it with jealous eye as a somewhat pretentious intrusion; and he naturally, although vainly, did his best to hold his own on equal terms, in a race for the possession of the whole field of calculous treatment. Time, however, as always happens, adjusted the place of each, and now they are no longer rivals, but are complementary the one to the other. Each operation has its special function, and takes its place only where the other ceases to be applicable.

Let us commence as before with lithotrity. In the series from my own practice, to end of 1886, already brought before you, were 756 cases of the crushing operation in the male adult, with 45 deaths; including in this number every kind of fatality immediate or remote which could be traced either to the operation itself or to its effects on previously existing disease of the urinary organs. These figures show a mortality

of only 6 per cent.; and the mean age of the patients was no less than $62\frac{1}{2}$ years.

Of the 756 cases of crushing in the adult male, the latter 279 were operated on by the one-sitting method; the former being those previously treated by several sittings, the usual course at that time. Among the 279 cases there were only ten deaths, or $3\frac{1}{2}$ per cent.—a minimum which I believe, for so large a total, has never before been attained. But in the latest 112 of these, only 3 deaths have occurred, a mortality of less than $2\frac{3}{4}$ per cent. I cannot give you a better illustration, nor has so large a comparison been yet afforded, of the improvement which the one-sitting method has effected in lithotrity. At the same time it would be unfair not to bear in mind that the former division of the cases includes my early experience, and it would be affectation to ignore the fact that these had not the advantage of that safety and facility in handling, as well as of matured judgment, which long experience can alone impart, and of which the second division derived the full advantage.

This brings us to the group of what may be termed 'selected bad cases,' in elderly men, the 'remanet' after having retained for lithotrity all the choice and promising patients. These only can, in the nature of things now, be submitted to the knife. Of these, after selecting the aforementioned 756 for lithotrity, there were 116 cases of lithotomy. The mean age of this class was also above 62 years. It is a matter of simple justice to myself to say here, that it has never fallen to my lot, at any part of my career, to employ lithotomy for the general run of cases; or even for a moiety of them, as was the habit of most operators at the date referred to. I have from the first adopted lithotrity for every case possible, and reserved the knife solely for the few and difficult exceptions. Further, although many of the most unpromising examples have been brought to me from considerable distances, as always happens to operators of unusual experience, I have very rarely refused a chance of life, however slender it might be, and have often operated, as one might in battle lead a forlorn hope. In all these cases, then, the calculi were unusually large or hard, or accompanying difficulties of other kinds rendered a cutting operation necessary. The method followed

was chiefly the lateral, a few being bilateral and medio-bilateral. No suprapubic operations of the modern kind are reckoned here, but will be considered by themselves hereafter: one, however, which I did in 1874, on the old method for a patient with immovable rigid hip joints, is included.

In the series thus described the fatal cases were forty, equal to a mortality of just one in three cases. For patients of this age and condition, that is a result equal to the average record which hospital statistics offer us, and is indeed better than some of the most recently published. But it is the sum of the two procedures which must be regarded as the measure of the surgeon's success, and his warrant for the choice he has made between them in dealing with calculous cases. The result here recorded only became possible through the introduction of lithotritry; it is attainable only by employing it for the great majority of all cases, and in its most modern and improved form.

And now I have briefly to say that, good as this result is, I am satisfied we have a still better one within our reach. I do not suggest that the operation of lithotritry with its 3 per cent., more or less, of fatal cases in elderly patients can be much amended, seeing that there is not margin for any large improvement. But for the class of 'selected bad cases' I have long been of opinion that a more excellent way ought to be discovered. That we should probably find this in an improved suprapubic operation, I ventured to state, more than four years ago, in my last lecture at the Royal College of Surgeons. During this period I have been enabled to test the question, and my opinion has been corroborated by unquestionable evidence. This we will discuss and illustrate at my next lecture.

I have only to add a few words on calculus in the female sex, which will terminate our meeting of to-day.

Calculus is, as you know, comparatively with its frequency in the male, seldom met with among women; and it is still more rare among girls, who show a marked contrast with children of the other sex. Lithotomy is seldom required in these cases, since small calculi—all for example below four or five drachms—are easily removed by careful traction through the dilated urethra, by means of light well-made forceps, or

the flat-bladed lithotrite, without inflicting injury on the urethra, at all events of a lasting kind. Larger than these should be crushed and removed by an aspirator at one sitting; although it must be confessed that this generally is less easy to accomplish in the female bladder than in the male, from the escape of fluid which always takes place, and the tendency to retain fragments on each of its sides which the organ manifests. A little more time and patience must be expended on the operation in order to empty the organ completely. The withdrawal of a calculus entire weighing an ounce or more cannot be advised, since it is more likely to produce incontinence of urine than when a moderate incision of the urethra is made. For a typical uric-acid calculus of a flat oval form, the long diameter of which measures two inches or more, I have hitherto always made a lateral incision from the urethra outwards to my right on a grooved staff, and to the depth of three-quarters of an inch to an inch, removing with a lithotomy forceps. I have then put two carefully adapted sutures deeply through the margins of the incision, and placed in the urethra a large gum-elastic catheter, about five or six inches long, so that all the urine may drain away continually for three, four, or five days. It is the business of a watchful nurse to see that the catheter is not blocked up, and that there is always a free passage through it. This method has yielded me most satisfactory results in the few cases of large calculus in which I have employed it. You may reckon, then, on avoiding permanent incontinence afterwards in most cases. Sometimes the retaining power of the bladder is partially, or even permanently, impaired after the removal of a large stone by any of these methods, and this is almost the only unsatisfactory result to be anticipated. Even this might be avoided in an extreme case by the high operation, which is as applicable here as in the male. I have never met with one sufficiently large to induce me to perform it, although I have done so for tumour of the bladder in women. Whatever the proceeding adopted, there is little danger to life. I have lost only one operation for stone on women, and in that case it occurred from pyæmia.

LECTURE XXII.

ON THE SUPRAPUBIC OPERATION OF LITHOTOMY.

GENTLEMEN,—At our last meeting we arrived at the conclusion, which I believe is wholly irresistible, that lithotrity at a single sitting is, in moderately experienced hands, the operation which ought to be selected for nine out of ten cases of calculus in the bladder occurring in adult male patients. The crushing operation, in short, is the best for the great bulk of calculous cases. Neither stricture of the urethra nor hypertrophy of the prostate, neither chronic disease of the bladder nor organic disease of the kidneys, are conditions which forbid the application of lithotrity or demand instead thereof any application of the knife. For the modern operation is equal to the safe removal, in practised hands, of hard calculi of very considerable size—say, for those which are even above 2 ounces in weight; the largest I have removed being a hard uric-acid calculus weighing $2\frac{3}{4}$ ounces, and with successful result. I by no means deny that even a larger size may be so extracted, but I do not say that it would be often prudent to attempt it. Much depends on the operator and his experience. Phosphatic calculi of still greater weight may be thus dealt with successfully. But there is a limit which no man can define even to the capability of modern lithotrity. There are calculi too large and too hard to be removed by that operation, and for which some other proceeding is necessary.

But let me here observe that such calculi ought not to exist, and that it is always somebody's fault when a calculus even of one ounce in weight is present in a human bladder. I by no means say that it is often the fault of the medical attendant, but the contrary, for the patient has very likely been without one; or he has perchance indulged himself largely in consuming some notorious 'remedy' for the stone, and has thus rapidly augmented, as I have occasionally seen, the size of the foreign body in his bladder; or he may have

been the victim of some incompetent quack, whose advertisements in every journal of new and superior treatment have attracted the weak but pitiable sufferer. By all these means the production of large stones is encouraged, destined when in that condition to be discovered as soon as the patient falls into the hands of a competent surgeon; and were this the place I could furnish you with many illustrations of the kind. But patients themselves are sometimes curiously wilful, obstinate, or indifferent. It is now nearly eighteen years ago since such an one came into my room with manifest symptoms of a small stone, which I found at once on sounding, and recommended him to have crushed without delay. He did not take my advice, and I saw no more of him, and very soon lost all recollection of the circumstance. Only two years ago, being sent for into the country to see a calculous patient aged seventy-six, and too severely suffering to come to me, I learned that this was my former visitor, who, having declined the advice then given him, had now, in his dire extremity and after many years of misery, summoned me to do my best for him. I performed the high operation forthwith, removing a stone weighing no less than six ounces and a half, which I show you here, and I am happy to tell you he made a rapid and complete recovery. After such a history, and so much suffering, you doubtless agree with me that he was a fortunate man.

Now, it will be clear to you, I think, especially after our previous discussion of the subject, that almost the only question in relation to this subject which surgeons at the present time require to determine is, What is the best proceeding to employ as a supplement to lithotrity for those unusually large stones for which that operation is inadequate? I do not say that any single proceeding is to be held up as necessarily the best and only possible one, applicable to every condition outside the comprehensive limits of the crushing operation; but that there is one which is, in my opinion, conspicuously superior to all others I have no hesitation in declaring. When I had the honour to fill the chair of Surgery and Pathology at the Royal College of Surgeons now four years ago, I stated my opinion, based on the experience of European surgeons personally known to me, that the high operation in its modern form, with certain recent modifications, was that

which would most advantageously replace the lateral operation for extremely large calculi, and that thenceforth I should certainly employ it. Well, this I have done; and my experience is now amply sufficient to satisfy me that we have no proceeding at all comparable to it for stones of the kind referred to. I will go further, and will add that it is my belief that in the hands of most operating surgeons this proceeding will prove a safer and a far easier one than lithotomy, with all its advantages, for hard stones when they have arrived at a weight of about $1\frac{1}{2}$ ounce or 2 ounces.

I may briefly trace the history of this operation. It dates from the middle of the sixteenth century, when Pierre Franco, of Lausanne,¹ met with a child, two years old, with a stone nearly the size of a hen's egg. He felt it above the pubes, and tried to force it down in the usual way, so as to cut 'on the gripe' in the perineum. Unable to do this, he decided to cut on it where he felt it, which was not in the middle line above the pubes, but on one side of it, and he extracted it successfully there.

Franco had no intention to design a new operation in this procedure, for he expressly recommends that his example should not be followed, regarding the good result as a happy accident—since wounds of the bladder were at that time deemed invariably fatal—and that the proceeding had been only warranted by the unusual position of the stone, and the impossibility of operating by the perineum. No doubt this case had some influence in originating what is known as the High Operation; but the method subsequently employed, and differing materially from that of Franco, was unquestionably designed by Dr. F. Rousset, of Montpellier, who had performed the Cæsarean section for women in labour, and who had thus become familiar with the abdominal operation, although he had never practised lithotomy. In a treatise on the former subject, he discussed at considerable length, and warmly advocated, the high operation by incision in the median line. He had dissected several dead subjects after performing the

¹ A recent writer has thought proper to call public attention to 'my error' in saying Pierre Franco of 'Lausanne,' substituting 'Touraine.' The error is his. Franco was born at Touraine, but was professor at Lausanne and practised there. See *Dictionnaire Encyclopédique des Sciences Médicales* 4^e Série, tome vi., p. 6: Paris, 1880.

operation upon them, having introduced foreign bodies into the bladder for the purpose, and in no case was the peritoneum wounded. Accordingly he devised various instruments for the purpose, and carefully described each step of the proceeding, besides illustrating his memoir with numerous drawings. Thus he suggested that the bladder should be well distended, and the penis ligatured before operating; directed the incisions to be made strictly in the middle line between the recti muscles, and the bladder to be opened close behind the pubic symphysis. It appears to have been long before this plan was actually tried, although the best authorities wrote of it in commendation (Hildanus, Tolet, Dionis, and others). There are intimations of its performance during the seventeenth century, but evidence is wanting to determine the question.

It was really brought within the domain of practical surgery by our own John Douglas, surgeon to the Westminster Hospital, whose essay thereon was published in 1720, detailing four successful cases in children. Deschamps himself, in his classical work, yields this position to the English surgeon. Cheselden performed it in the beginning of his career, and advocated it in an excellent monograph (1723), with records of nine cases, boys and youths, the oldest being nineteen. Up to this time the bladder was forcibly distended by water or urine, but no staff had been used as a guide to the operator. Nevertheless Cheselden soon after—attracted perhaps by the success of Rau in Holland, who was employing an early form of the lateral incision, and learning, moreover, that some of those who had adopted the high operation had fatally wounded the peritoneum—designed an improved operation by the perineal route, after changing his method once or twice. But it is highly important to remember, in estimating these proceedings of Cheselden, that three-fourths of all the stone-patients at this epoch in surgical history were children, and that no question of what was best adapted to the special needs of the adult had arisen, much less had it been seriously considered and discussed. Thus the lateral operation obtained reputation and a footing, on the strength of its success with the little patients; and for the next century and a half it was employed not only for them, but was, without due or special consideration, adopted for the adult patient also, here and elsewhere—a circumstance which will some day be generally

regarded as a disastrous one, in regard to the interests of the latter class. That the change thus made cost hundreds of adult lives which might have been saved by the high operation, I have no hesitation whatever in affirming, with a profound conviction of the importance of the assertion. To proceed : in the latter part of the century (the eighteenth) Frère Côme did the high operation successfully in Paris, and the French surgeons employed it subsequently for the largest calculi, gradually improving the procedure (Deschamps, Dupuytren, Soubierbielle, Velpeau, Civiale). Carpue recalled attention to it here in 1819, and it has been occasionally, but rarely, performed from time to time ever since.

An examination of the very interesting literature, a small portion of which only has been referred to in this outline, shows that two chief sources of danger have been more or less associated with the high operation in the minds of surgeons from the earliest times to the present. The first is the chance of injuring the peritoneum, from its natural proximity to the symphysis pubis; the second is the possible occurrence of urinary infiltration and its effects in the cellular tissue around the bladder. The first is unquestionably the chief risk and the most to be dreaded, due as it may be to the narrow limit in some subjects of what may be called 'the suprapubic interval.' Were this interval a constant quantity, so that we might be certain that the peritoneum would never be encountered below a certain line, the objection to the operation would have been less. But the extensibility of the bladder differs so much at different ages and in different circumstances, that, supposing original conformation to be uniform in all individuals, which is not the case, some variability in the extent of the interval must be reckoned on. It is the element of uncertainty as to the situation of the peritoneum which has occasioned a general fear of making incisions in the locality described, a question to be presently discussed, and I believe you will agree with me to be satisfactorily disposed of.

The second is the alleged liability to dangerous infiltration of urine about the neck of the bladder. I do not believe there is the slightest fear of the accident if the operation has been properly executed. Infiltration of urine was formerly regarded as the chief danger in the lateral operation when the stone was large, a view which is no longer admissible. I may

say that it has not taken place in one of my own cases of the suprapubic operation, now 23 in number. Unless there be unnecessary interference with the cellular connections low down between the anterior surface of the bladder and the pubic arch—and all interference there is unnecessary and can only occur through a blunder—it is difficult to imagine how such infiltration should be occasioned.

But on the other hand it is agreed by all surgeons that the perineal route to the bladder offers several sources of danger, demanding careful study from the student and constant circumspection by the operator. Indeed, I think it must be granted that these are far more serious than those which beset the suprapubic route. They are, moreover, tolerably constant, and, indeed, but too persistently present. The one uncertain risk affecting all forms of perineal lithotomy is that of hæmorrhage, sometimes due to unusual distribution of a blood-vessel, which is far from uncommon, cannot be foreseen, and may be severe; while in operating by the lateral method, the surgeon must always be prepared for hæmorrhage, since it is liable to occur in any adult case from more than one source. Another source of danger is, liability to injure the rectum, especially in elderly men, with the not unusual consequence thereof, a urethro-rectal or perineal fistula. Still more serious is the infliction of injury on the neck of the bladder, not so much by the knife or gorget, as by the bruising and splitting of tissues which inevitably occur from the process of extracting a large stone through that narrow outlet. No stone of $2\frac{1}{2}$ ounces or 3 ounces in weight can be removed, however well placed in the blades of the forceps, without considerably lacerating the vesical neck; and when stones of double that weight are so extracted, the injury is very great. Hence it is that the mortality from the lateral operation is in almost a direct ratio with the size of the stone, when dealing with those which weigh upwards of 2 ounces. When the weight reaches 5 or 6 ounces, without undergoing fragmentation—itselt a difficult and dangerous proceeding in an empty bladder—the injury inflicted on all the delicate structures constituting the lower half of the bladder and the circumjacent parts must be so extreme, that one is sometimes surprised that recovery should ever be possible. And then

another source of danger arises in the fact that this lacerated route, is the only channel by which urine leaves the bladder after the operation. No contrivance has ever been invented to protect the wounded surface from constant contact with urine and with morbid discharges of various kinds.

I think there will be no difficulty in making it clear to you that if we can eliminate from the suprapubic operation its one source of uncertainty and danger relating to the peritoneum, we possess a means incomparably superior to the lateral procedure for large stones, if not, indeed, for any which cannot be easily removed by lithotrity.

For, first: there is no other important structure near the line of incision which can be injured by the knife or the forceps. The rectum and the sexual organs are out of the way.

Secondly: the space for removing the stone is practically unlimited, and the act of doing so is free from danger.

Thirdly: there is no risk at all from arterial hæmorrhage. Some large veins may be met with which are troublesome if cut, but these are easily avoided.

Fourthly: the incisions are more easy to perform than those of lateral lithotomy, all being made under the eye of the operator.

Fifthly: the outflow of urine is easy and direct.

Sixthly: antiseptic dressings can be readily employed, which is not the case in the lateral operation. This is deemed a very important advantage by some. I cannot estimate it so highly, having long ago pointed out, when comparing my large experience of lithotrity and of lateral lithotomy (in which latter operation antiseptic treatment is impracticable), that, although the wound is exposed to manifold sources of impurity, the occurrence of blood-poisoning is rare, being indeed more frequent in the crushing than in the cutting operation.¹ Furthermore, I performed every one of the cases of suprapubic operation referred to without any special antiseptic precautions, using care to ensure cleanliness in the instruments and dressings employed, and weak solutions of

¹ *Medico-Chirurgical Transactions*, vol. lxi., p. 175. Paper on 'Résumé of 500 Cases of Stone operated upon,' by Sir. H. Thompson. In twenty-nine deaths after lithotomy there was only one case in which the event was due to septicæmia.

carbolic acid for all necessary applications, varying with the object required, and replaced sometimes by the use of boroglyceride, and of boracic acid lint for a local covering. I have never used the spray or impermeable dressings to the wound in a single case, believing them to be unnecessary. The wound has been always freely exposed to air whenever the dressings are changed, as they frequently are. Neither do I employ any antiseptic precautions in exploring the bladder and removing

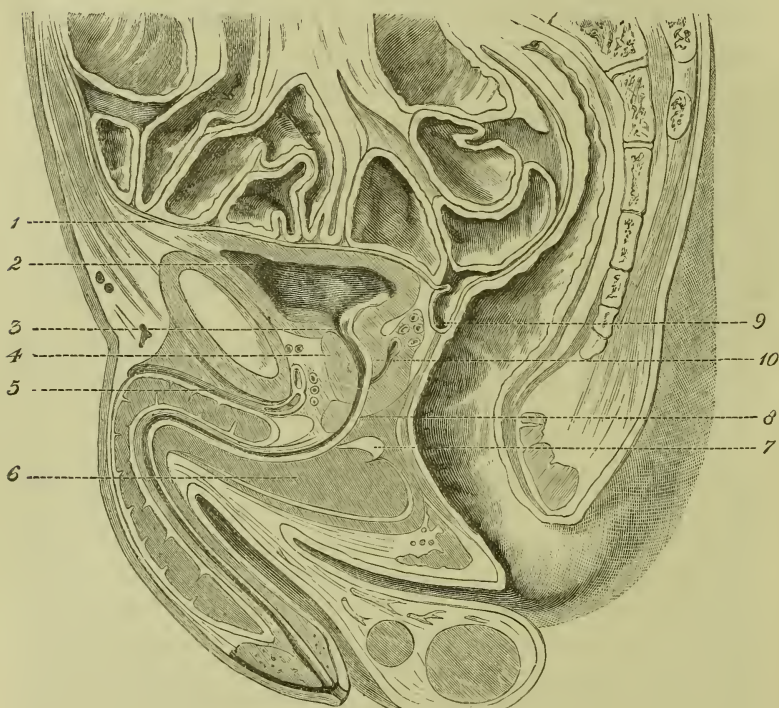


FIG. 88.—Section of pelvis, bladder, and rectum—natural.

tumours by the perineal route, a proceeding which I have done some seventy times during the last five or six years, and only one case of pyæmia has occurred, and apparently in the same manner as the few examples after lithotrity have been occasioned—viz., by inflammation of vesical veins through prolonged cystitis or mechanical injury; and this is now rare since adopting the system of emptying the bladder completely at a single sitting.

We have only to deal with the question of danger arising from proximity of the peritoneum to the line of incision. Can we ensure the presence of an adequate suprapubic interval through which a calculus of the largest size can be safely extracted? I think this important question can be answered in the affirmative. During the last twenty-five years

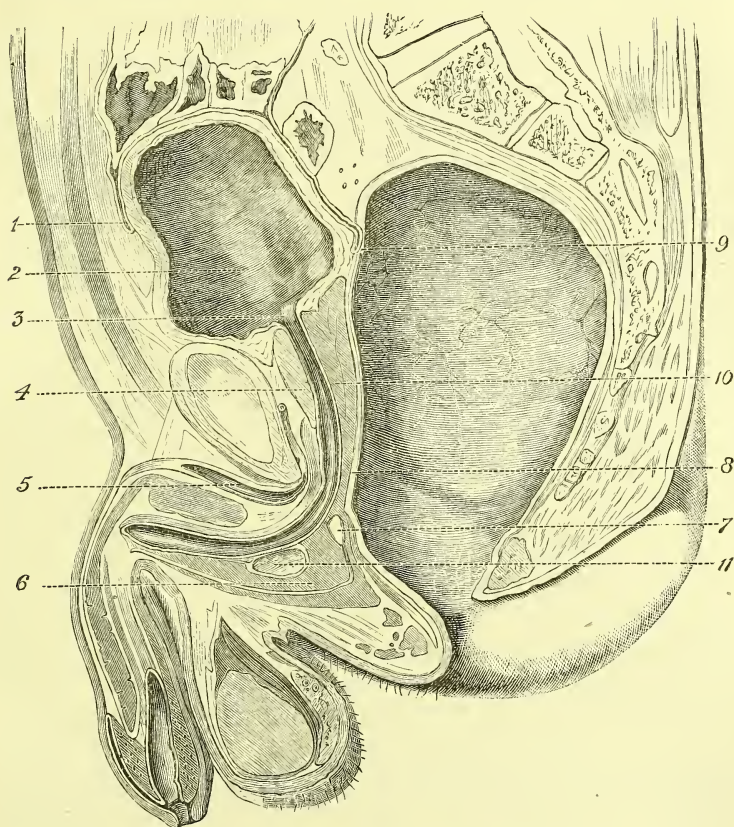


FIG. 89.—Section of pelvis, rectum distended, bladder injected.

various observations have been made by Pirogoff and others, in relation to topographical anatomy by section of the frozen body, embracing this among other subjects of inquiry. By no means the least important of these was that made by Dr. J. G. Garson, now curator at the Hunterian Museum here, who prosecuted some laborious researches at Vienna in 1877 on the effect of rectal distension upon the bladder in adult bodies

afterwards frozen, sections from which were carefully measured by him, and drawn. His memoir thereon was read at the Congress of German Surgeons, April 12, 1878: it was illustrated by plaster casts of the sections, and the drawings afterwards published in Germany, and also in this country in the following autumn.¹ Professor Petersen, of Kiel, was present, and there is little doubt that he was thus led for the first time to test by practice the theoretical question of abundant space for the high operation there raised by Garson. For in April, 1880, at a subsequent meeting of the same Congress, Petersen read a paper advocating a resort to the suprapubic route, on grounds derived from the facts described; and he appears to have been the first to establish the practical facility which they offered to the lithotomist called upon to deal with calculus of large size.² The method which he had adopted, and then proposed, was to inject the bladder as far as it would fairly bear with some antiseptic solution, then to introduce a pear-

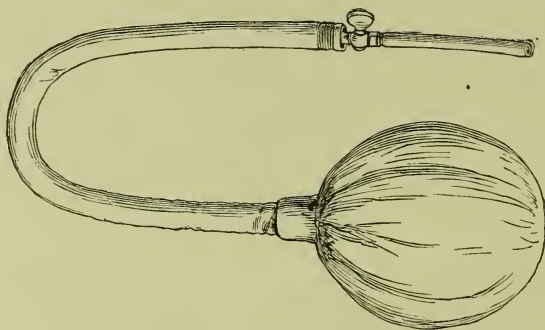


FIG. 90.—The original bag for injecting the rectum.

shaped indiarubber bag with a capacity of about sixteen ounces into the rectum (fig. 90). This being distended, the bladder gradually rises into the abdomen and carries with it the fold

¹ 'Dislocation der Harnblase und des Peritoneum bei Ausdehnung des Rectum': von Dr. Med. J. G. Garson aus Edinburgh. Read at the Congress of German Surgeons at Berlin, April 1878, and published in the *Archiv für Anatomie*, 1878, p. 171, with plates. In England this paper was first published in the *Edinburgh Medical Journal* in October 1878, and as a pamphlet shortly afterwards.

² Memoir read at the Congress of Surgical Science at Berlin, April 7th, 1880; appearing in the *Archiv für Clin. Chirurg.*, vol. xxv. 1880.

of peritoneum, thus leaving above the pubes the interval described, in which the necessary incisions can be safely made. The steps of the proceeding were then not materially different from those adopted by previous operators. Finally, the stone being removed, Petersen employed sutures to bring together the sides of the wound, leaving only space for a tube to convey the urine from the bladder. In one case he attempted to close the bladder entirely by sutures, but without success.

The proceeding was adopted subsequently in Germany, with and without modifications, chiefly in the cases of children, and with most satisfactory results. In Vienna, Professor Dittel soon declared in its favour; but he preferred air to water for distending the bladder. When in dissecting he reached the transversalis fascia, he divided the fat and drew aside the veins with the finger, cutting and tying each end if necessary. Périer was the first to try it in Paris in 1881;¹ he was soon followed, among others, by Guyon, whose practical paper, containing an account of eight cases, appeared in 1883.² I advocated the proceeding, on the basis of these and other reports, in my lectures, as above stated; and in less than a month afterwards performed the new operation for the first time in this country, not having met with an example of calculus, during more than a year, sufficiently large, according to my judgment, to warrant me in substituting a cutting operation for the crushing one. In July 1884, I removed from a man aged 36 a calculus of pure cystine, weighing $2\frac{3}{4}$ ounces, and he made an excellent recovery.³ Since that time I have performed 22 other cases, making 23 by the new method, with 3 deaths only; most of the other patients are living and well at the present date, autumn 1887.

I shall now consider the practical mode of performing the operation, detailing the steps which appear to me to be necessary in order to accomplish it safely and easily. I have already said that it is a simple proceeding and easy of performance; certainly more so than lateral lithotomy. Much has been written, as it appears to me, with a tendency

¹ *Mémoire à l'Acad. de la Méd.*, Aug. 1881, by M. Périer: Report thereon by Gosselin, in September.

² *Contributions cliniques*, by J. T. C. Guyon: *Annales des Mal. des Org. Urin.*, Paris, 1883.

³ *The Lancet*, Oct. 11th, 1884.

to associate unnecessary complications with the new method, to induce the surgeon to take certain needless precautions in the way of preparatory treatment in relation to the practical operative proceeding and to the after-management. No previous preparation of the bladder is necessary. Attempts to increase the capacity of the viscus by preliminary injection, which some surgeons have made, almost invariably fail to accomplish the object aimed at; on the contrary, they increase already existing irritation. Furthermore, a capacious bladder is by no means necessary.

An empty condition of the rectum having been ensured by enema, the patient may lie on his back on a table, with his head and shoulders slightly raised. I first pass a flexible catheter into the bladder, since this is sometimes less easy to accomplish after the rectum is distended. Next, provided he is fully under the influence of ether, an empty indiarubber bag (the form which I have adopted is shown at fig. 91) is to

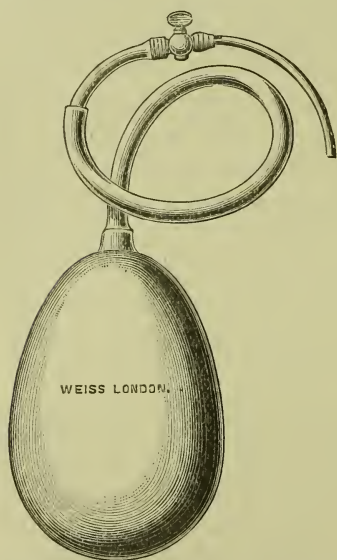


FIG. 91.—An oval form of rectal bag, generally preferable.

be tightly rolled in the form of a cone, well greased, and with a firm hand introduced into the rectum, taking care that it shall be completely above the grasp of the sphincter. Then, about twelve, or fourteen ounces of water at most are gently thrown into the rectal bag, after which the bladder is to be filled through the catheter, injecting slowly and gently a few ounces, estimating the resistance perceived in the act, by the hand applied to the suprapubic region, as well as the degree of eminence, for it is generally obvious to the eye; also taking care to avoid force. The rectal distension is essential; the vesical need not be

considerable, but varies with the habit of the bladder from eight, say, to about fourteen ounces. The fluid used may be a mild antiseptic solution, such as one of boracic acid. Em-

ploying carbolic acid solutions uniformly for most purposes, I generally inject one not exceeding in strength 1 part in 1000. The catheter being withdrawn, the base of the penis is firmly ligatured with an indiarubber tube. Palpation above the symphysis now demonstrates the position of the bladder, most of it lying above the brim of the pelvis in the form of a rounded ball.

Having taken my place by preference on the patient's left side, a vertical incision of the skin and cellular tissue strictly in the median line over the salient bladder is made, about three inches long or a little more, overlapping the hard upper border of the symphysis below. The skin may be conveniently divided by transfixing a fold lifted up for the purpose; the precise method, however, is not material. This being done, I lay aside the knife and prefer to use only the right index finger-nail for separating the tissues, which differ in thickness according to the amount of fat present, a matter very easily accomplished, until the linea alba is reached. The handle of

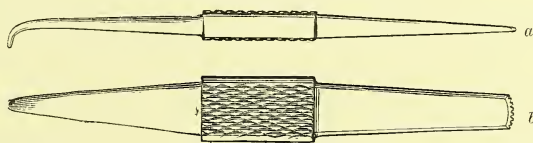


FIG. 92.—Ivory separator. *a*, side view, to show hook; *b*, full view.

the scalpel or a probe may be employed in aid, but I prefer to these an ivory hook (see fig. 92) with which I now divide, separating all the soft tissues with it, and removing veins etc. which intersect the route with ease and safety. Having arrived at the glistening surface of the linea alba, an opening



FIG. 93.—Flat director.

may be scratched in it, or a few fibres raised with the artery forceps and a small opening made with the blade of a scalpel so as to admit a wide flat director (fig. 93) to be carried beneath, on which to divide that structure upwards and downwards for about an inch and a quarter in each direction. The muscular fibres beneath being separated as before in the

median line, the transversalis fascia is soon met with, and if dense may be divided like the linea alba. In many subjects it may be scratched through with the hook or the point of the scalpel. If a large opening is required, a small portion of the insertion of a rectus muscle into the pubic ramus of either side may be incised. As soon as the transversalis fascia is divided, the characteristic yellow fat covering the bladder comes into view. This should be carefully separated in the middle line by means of the finger-nail or hook, always drawing the fatty tissue upwards from behind the symphysis pubis, so as to place the peritoneum out of reach should it be near, until the prominence of the distended bladder is easily felt, and perhaps even the stone, as it is covered only by the vesical wall, beneath the operator's finger. Veins appearing hereabout may give much trouble by bleeding if the knife is employed; but for this, however, there is no occasion; they may be safely removed from the line of action until the fibres of the bladder are exposed. After due examination a small but well-curved hook should be carried through the vesical coats, so as to secure a sure hold, when a little fluid is seen to issue by its side, proving that the bladder has been fairly entered. Maintaining the hook, elevated by the left hand, a scalpel in the right makes a small puncture by the side of the hook (which still retains its hold) just sufficient for the index finger to be introduced and partially stop the outflow of urine now rapidly issuing from the orifice. A few moments will suffice for the finger to determine the size, form, and position of the stone, and to decide how large an opening is necessary for its removal. I make the opening by introducing the left index finger by the side of the right, separating the two fingers gently so far as may appear sufficient to accomplish the purpose, thus avoiding the use of the knife, and with it sometimes troublesome hæmorrhage.

The extraction of the stone may be made in the usual manner by means of forceps, but I prefer to effect it, if possible, by using the two index fingers as blades, while the two hands are locked together by interclasping the other fingers of each. One finger is insinuated beneath the stone, the other index follows above it, and although each is thicker than the blade of a forceps, the flexibility and intelligence which appertain

to the fingers generally make them safer and more efficient instruments than any other. The bladder is now ascertained to be free from other contents, and little else remains to be done.

When, however, our object is the removal of tumour, it is desirable to pass a loop of stout silk through each margin of the vesical opening in the same manner as we have been accustomed to do in the borders of the cut urethra when opening it from the perineum in front of an impassable stricture. Each loop, gently held up by an assistant on either side, gives easy access to the bladder, which may be further aided by letting a little of the liquid issue from the rectal bag. This is to be withdrawn altogether as soon as the stone or tumour has been removed, for it should be borne in mind that its presence, doubtless by causing pressure on the veins, tends to promote free bleeding: hence, when this is severe, the bag should be removed as soon as possible, the effect being sometimes remarkable.

The wound is well adapted to give issue to the urine, and I have seen no danger of infiltration if the opening is left quite free for the purpose. The only attempt I have made to limit its extent has been by introducing a large suture about an inch below the upper angle through the abdominal walls, and sometimes another an inch below that; but I have never used a single suture in the bladder. Before stitching, however, I insert in the bladder at the lower angle of the wound a tube made of silk gum, about a third of an inch in diameter, and six or seven inches long. It is a good plan to attach this by a firmly tied ligature to the lower of the two sutures, which effectually prevents its slipping. The tube may be left for about two days or so to ensure a free passage for the urine, and then be removed. I have rarely found any catheter necessary. The patient lies on his back during the first twenty-four hours, and then on each side alternately for six hours at a time, and all the urine runs easily in this way from the wound, and excoriation of the skin is prevented by one side only being wetted for that short period at a time. No other dressing at first than layers of lint soaked in weak carbohc acid solution, or in one of boracic acid, is necessary. Among the entire series of cases one artery only was tied, and

no torsion or other method was required, and there has been no venous hæmorrhage. This result I attribute to the substitution of the finger-nail and the ivory hook for the knife in the division of all tissues except the three layers named—the skin, the linea alba, and the transversalis fascia.

Finally, I am satisfied that the operation described is well adapted for tumours of the bladder when ascertained to be of large size, and when they are not merely polypoid growths of a simple kind, which are easily removed through the perineal incision. This question will be considered hereafter when we

treat of that subject. I adopt, however, a modification of the operation for the cases of women, in whom it is not easy to maintain distension of the bladder as in the male. It consists in the use of a staff of peculiar construction, distension of the rectum being first made as usual. The instrument is strongly curved at the end, like that shown at fig.

FIG. 94.



FIG. 95.



FIG. 94.—End of the sound filled by the bulb, as passed into the bladder.

FIG. 95.—End of the sound with bulb withdrawn, showing the opening or slit into which, when a hook is passed, a firm hold of the bladder is secured.

approaches the bladder, close above and behind the pubic symphysis, and on the bulb being then withdrawn the operator's finger recognises the slit, and he is enabled to pass a hook into it, or a needle with silk so as to hold up the bladder securely while with the other hand he opens it close by with a scalpel. Thus the bladder is secured from slipping down into the pelvic cavity round the emerging staff—an embarrassing accident, rendering the reopening of it difficult, and the attempt possibly sometimes even dangerous, from injury to the cellular connections outside the neck and base of the bladder taking place as the result.

LECTURE XXIII.

ON THE INFLUENCE OF RENAL DISEASE ON THE CHOICE OF
OPERATION FOR STONE IN THE BLADDER.

[THIS lecture was given about three weeks after the death of the Emperor Napoleon III., and was intended to relate thereto ; a patient in the hospital at that time (January 1873), whose case somewhat resembled that of the Emperor, furnishing the ostensible theme.]

GENTLEMEN,—During the last ten weeks of the year 1872 eight cases of stone in the bladder were admitted to my wards. Of these, seven were adults, chiefly of advanced age ; lithotritry was performed for all, and each patient has been discharged cured. The eighth case was that of a lad aged ten years ; for him I performed lithotomy, and he also went out well. Towards the end of January 1873, I returned to my duties here, and found a case just admitted, which possesses characters of considerable interest. I propose therefore to make it the subject of this lecture.

The man was sixty years of age. His first calculous symptoms appeared nearly three years ago. He was admitted to a hospital last summer with a rather large phosphatic stone, for which lithotritry was performed. He left relieved, but passed portions of phosphatic matter occasionally, obliging him to use a catheter sometimes to remove them. His bladder was in that condition in which phosphates are rapidly formed.

Present state (January 24).—Passing urine every half-hour day and night, with much straining and great pain : compelled always to leave his bed for the purpose. Urine pale, turbid, alkaline ; specific gravity 1009 ; a granular cast found at first examination. General condition extremely feeble.

You will remember that soon after his admission, and on first examining him, I made his case the subject of prolonge

clinical remarks at the bedside in the ward, stating that the patient was the subject of chronic renal disease, discussing the influence this condition must have on the course to be pursued, were there still a stone in the bladder; and that I should make a careful attempt to remove any fragment or phosphatic matter which might be the cause of his sufferings. I did so, taking away a small quantity without difficulty. On January 26 he had passed a little *débris*, and the intervals of micturition were prolonged. On the 28th I removed one very small piece. On the 31st I made another short examination, discovering nothing. That very afternoon, contrary to orders and in the absence of the nurse, he went out of doors into the cold air in the yard. On February 2 he had a rigor, temperature rising to 103° . On the 3rd, another. On the 4th he was drowsy and incoherent. I ordered hot linseed poultices sprinkled with mustard to be applied frequently to the loins. Pulse was about 100; temperature 100° ; urine but little diminished in quantity. This condition continued about two days, when he was much less sleepy, his intelligence returned, the tongue (which had been loaded) began to clean, and he took food very fairly. We had quite given him up, as you know, on the 4th, and now began to hope he would rally for a time. But on the 8th and 9th he was not so well; the urine acquired a marked blood-tint. Hot poultices to the loins were followed by manifest improvement on the 11th and 12th. On the 13th the urine was again worse, the patient weaker and indisposed to take food. On the 17th the drowsiness and incoherence reappeared; temperature was below natural; pulse weaker; urine more bloody. He gradually sank, dying in the evening of the 19th.

At the autopsy we found conditions of which the following is a very brief *résumé*: Bladder thickened; grey discoloration of mucous lining; patches of false membrane adhering. Very marked bar across its neck uniting lateral lobes of prostate; deep pouch behind, containing a few small phosphatic concretions, weighing 12 grains. Ureters somewhat dilated; the left more so than the right. Kidneys surrounded by fat, vascular and indurated, attached to the capsule, which peeled off with renal substance adhering, and opened tiny abscesses. Surface lobulated, minutely granular. Size nor-

mal, as if a granular contracted kidney had been temporarily enlarged by inflammatory action. Surface of right greatly congested, hæmorrhage in places; left less so. Cortical portion in both thin; in left particularly so. Section brownish, with small, pale, yellowish spots interspersed; the pyramids intensely congested. The pelves dilated; lining membrane deeply injected throughout. Microscopic sections were made, and on examination the tubules were seen in some parts to be filled with granular epithelium. The Malpighian bodies were surrounded by crowds of young cells resembling corpuscles. On microscopic examination of a section of the kidney hardened in alcohol, the tubules of the cortical part were found to be irregular in size; some dilated, some narrowed. In the dilated tubules the epithelium was granular, the cells being shrunken and atrophied. The epithelium had entirely disappeared in some tubules, and the lumen was filled with granular débris. Between them, in all parts of the kidney, were crowds of young cells. Around the Malpighian bodies these were accumulated five or six deep. In some parts in the immediate neighbourhood of the small abscesses the structure of the kidney was undistinguishable, and its place occupied by masses of young rounded cells.

For this poor fellow the only question to be entertained was how best to relieve or palliate the painful complication of his fatal malady: advanced Bright's disease, the one; diseased bladder, containing phosphatic matter, the other. It was not a question of cure, nor could there be any prospect of it. His stone had been previously removed; but the decomposed urine and mucus together were daily forming phosphatic deposits, which, cohering and drifting into the urethra, occasioned intense pain. Such a subject is only one of several which are naturally suggested by the case before us. I shall, therefore, take the opportunity of discussing briefly a large theme arising out of this, which may be thus stated.

When stone in the bladder coexists with any disease of the kidney, how does this influence the decision in regard to operative proceedings for the former?

1. I must first define what is to be understood here by the term 'disease of the kidney.' It is a comprehensive one, and

is apt to be employed somewhat loosely. It embraces, of course, all the morbid affections to which the kidney is liable. These I shall endeavour to classify in a broad and general way, and in doing so will first put aside, as obviously foreign to the subject in relation to operative measures, the malignant diseases of the organ.

(a) Those chronic changes in the kidney-structure associated with constitutional cachexia, of which they may be more a local expression than a cause, and which are comprehended under the term 'Bright's disease,' form an important proportion of the maladies in question. In the dead-house you know that we meet with kidneys differing very much in appearance, size, and structural characters, all yet furnishing examples of different kinds of Bright's kidney, or, in some cases, of different stages of the same kind of disease. Most are included under the distinct types of 'the granular contracted kidney,' like that of our patient, and 'the large, smooth, white kidney.' Not to overlook a much more rare condition, I just name the 'lardaceous' or so-called 'amyloid' degeneration. Now, the symptoms which denote Bright's disease are, for the most part, sufficiently clear and distinct during life, as you know; and the amount or stage of disease is, within certain limits, fairly calculable after some knowledge of the patient.

(b) Another kind of change which is wholly distinct from the foregoing occurs in kidneys which are either frequently or for a considerable time the seat of calculus.

The presence of minute foreign bodies, for the most part aggregations of uric-acid crystals, in the uriniferous tubes, at their orifices and around them, in the calices, is a cause of injury to the structure affected in a degree corresponding to the duration and the magnitude of the deposited matter. Any degree of injury, from a circumscribed and temporary inflammation of the lining membrane of the pelvis caused by a large quantity of rapidly formed crystals, up to almost entire destruction of the organ from the presence of a large renal calculus, may be observed. Happily the latter condition is rare. On the other hand, the former is very common. I doubt whether any man passes much concrete uric acid for a few months without some very slight damage to the kidney.

Certainly, during the process blood is almost always to be found in the urine by the microscope. Nevertheless, this condition may continue for a good many years without giving sign of any serious mischief taking place. Moreover, when such a patient makes a radical change in his diet and habits, and so gets rid of his calculous habit, he seems in after years to have taken little harm. But we cannot doubt that when the habit of periodically passing uric-acid calculi has continued unchecked for many years, permanent injury is inflicted on the kidney. There are no very special signs of this condition. The patient's general health is often very good. There is no cachexia as in the class of diseases (*morbis Brightii*) just referred to. On the contrary, the patient is often hale and hearty in appearance. The characters of the urine are good; quantity abundant; specific gravity full average; no albumen, but urates often in excess, and blood-discs are present, insufficient to affect the naked-eye tint of the urine. Pain about the renal and sacral regions and the hips is often complained of. But I have had occasion to remark that such patients sometimes exhibit considerable febrile phenomena on instrumental interference, and that, although they look so well, more than ordinary caution is necessary in dealing with their calculi.

(c) I name without further allusion to it here, saccharine diabetes, which cannot be passed over while considering renal diseases. To save returning to the subject, let me say that there is no question that for this and the preceding class, in which patients with vesical calculus are usually elderly, lithotripsy is certainly preferable to lithotomy, unless the stone is large. The exercise of caution on the part of the operator to employ instruments as little and as gently as possible is essential. I have operated on two patients with success who were the subjects of marked saccharine diabetes, one of them within the last month; both were very sensitive to mechanical interference. Before the last-named I had operated on two more, in both of whom the diabetes was of long standing: on one by lithotripsy, on the other by lithotomy; both patients were seventy years of age, and died shortly after the operation. I think that advanced diabetes renders the case unusually hazardous in relation to operations for stone; and in

all cases occurring in elderly people, of kidneys long troubled by the presence of renal calculi, more or less increased risk is likewise incurred in performing grave operations on the urinary passages.

(*d*) The last class of renal changes which I have to consider are those resulting from diseases which habitually obstruct the outflow of urine. These affections also are not uncommon, and have an intimate relation to our subject.

Many years ago I described the process by which such renal changes occur. The principal conditions which originate them are, stricture of the urethra, enlargement of the prostate, large vesical calculus, and, less commonly, atony of the bladder. The order of enumeration is also the order of numerical frequency as a cause. Stricture always constitutes an obstruction to the outflow of urine commensurate with the degree of the narrowing. Considerable prostatic enlargement is a cause also, but notably less powerful than the preceding. Vesical calculus sometimes acts in the same way, but by no means as a rule; on the contrary, it is an exceptional circumstance when it does so, depending on certain conditions which vary with the individual, such as the habitual position it occupies in the bladder, its size, its liability to roll to the neck, &c.

This, however, is certain, that in cases of long-standing calculus, an autopsy will sometimes show only slight signs of renal changes produced by obstruction, while in another case those changes will be remarkable for their extent and degree. In no instance, be it remarked, do such changes occur apart from obstructed micturition in some form, and always of long standing.

The changes I refer to are dilatation of all the urinary passages behind the point of obstruction. Thus, in stricture of the urethra, we may observe dilatation of the urethra itself and of its glands; protrusion of the mucous lining of the bladder through the interlacing fibres of the muscular coat, producing sacculi; dilatation of the ureters, of the pelvis of the kidney, of the proper renal structure, and thinning by pressure of the renal substance itself; so that the organ has the appearance of a series of cysts, the local formation of which without known cause was formerly regarded as being

in itself a specific pathological condition. I may refer to a work published in 1854, where the details were given by me with considerable minuteness of the changes which occur to a large extent, although not altogether, through the influence of fluid pressure.¹ Let us consider for a moment the mechanical influence which is exerted in helping to effect this remarkable series of changes. You know that hydraulic pressure is equal in every direction. Thus, if I make pressure on a flexible bag filled with fluid, that pressure is exerted equally at every point of the periphery; and if tubes are inserted, say in a vertical position at opposite sides, the fluid will rise and issue with equal force from each. Now, what happens in the flexible bag which constitutes the human bladder when obstruction exists in the form of stricture, enlarged prostate, or calculus? More force than natural is of course exerted to accomplish the act of micturition; the patient 'strains,' as he says, to pass his water, and sometimes, if the obstruction is considerable, the force exerted is very great. You see at once that this tells not only in the anterior direction upon the obstruction itself, but also on the ureters which enter the bladder from the kidney behind. Let us say that the ordinary pressure required to pass water in the healthy organs is one pound to the square inch (one number being, for the sake of illustration, as good as another); when obstruction is present the pressure may certainly be increased, two, three, five times, or more. Further, the act of relieving the bladder, instead of occurring only five times in the twenty-four hours, and being speedily completed, may recur ten or twenty times, and the duration of the act may be greatly increased also. It is not necessary to explain to you how this state of things must act, and that after a time (for the mouths of the ureters, not being so patent as the inner orifice of the urethra, do not easily yield to pressure) every act of straining tells on the passages, and dilatation advances by degrees until at last even the kidney suffers from the continued pressure and from the inflammatory process which necessarily accompanies it; for the ureters and pelves of the kidney may become supplementary reservoirs to the bladder, and are sometimes found filled with decomposed and ammoniacal urine. Long before

¹ *Stricture of the Urethra*, first edition, pp. 64-70.

this stage arrives inflammatory action invades these parts, a condition recognised, as you know, as pyelitis [diagram of dilated organs made].

It has been a custom with some to denote this condition by the term 'surgical kidney,' while others have applied it to describe the acute suppurative nephritis which sometimes closes the scene for a patient who has long had renal disease. I was glad to find Dr. Dickinson proposing at the Medico-Chirurgical Society to abolish so unphilosophical a term. It is one I never use, and moreover have a rational ground of objection to. Why 'surgical' kidney indeed? Certainly in one sense only can any relation with 'surgery' be suggested—namely, that the want of surgical treatment alone has permitted these changes to progress to a fatal issue. If that aid were rendered early in the history of the case, whether it have been occasioned through stricture or stone, no such condition would ever arise. Never was the proverb truer that 'a stitch in time saves nine'—a surgical stitch, you understand. The pathological condition thus attained might perhaps be termed 'mechanical dilatation' of the ureter and kidney, as being mainly, although by no means necessarily, altogether produced by the physical process described.

Let me now inquire: What are the symptoms which it produces during life? I know of none which are distinct and significant. I made this, I had almost said, humiliating admission, several years ago at the Medical and Chirurgical Society, laying much stress on the fact for the express purpose of inviting attention to it.¹ I have long sought for some

¹ Referring to it, I said: 'It must be admitted that at present we have not an unfailing means of ascertaining the existence, during life, of these conditions. There may be no albumen in the urine, and not necessarily are there any deposits significant of the renal affection. The urine of a calculous patient frequently contains mucus, pus and blood; but whether the origin of these is in the bladder (naturally its most common source from the irritation of the calculus) or in the organs above, it is impossible always to determine; and usually there are no casts or other pathognomonic signs of disorganising renal structure. In fact, neither physical signs nor subjective symptoms are by any means frequently present, and yet advanced pyelitis, and even sometimes chronic nephritis, may exist. . . . Could the existence of these conditions be accurately diagnosed beforehand, it might become a question whether the crushing operation, or any operation at all, should be performed. For there is little doubt that the existence of such organic changes is almost as surely a source of fatal issue in lithotomy as in lithotripsy. Now, in the twelve cases before us, one or other of these

sign that should indicate the presence of extensive pyelitis and dilatation, but in vain. Such a patient presents no sign of change in the urine itself. It may be of full specific gravity, fairly abundant in quantity, without albumen, except that which the presence of pus and blood accounts for, and such pus and blood are commonly found as vesical products formed by irritation from the calculus in cases where no renal disease exists. Whenever you have stone of more than small size you may have such products, and we are bound to expect them if the patient has any symptoms of cystitis, and some cystitis is always present in these cases of dilatation. Again, there is nothing which we can identify as disintegrated portions of renal tissue—no casts of tubes, nothing but pus and blood-discs—nothing, in short, distinctive. Then at no stage of the disease is there any dropsical effusion, no habitual dryness of the skin, not necessarily any marked feverish state, constant or intermitting. Nor is there any diminution of weight; on the contrary, the patient may have gradually acquired fat. But he is always, if the condition is advanced, in feeble health, is worn, and easily exhausted—signs which impress you with nothing so much as his obvious inability to bear any severe test of his physical powers, from all of which, however, nothing absolutely diagnostic can be inferred.

But it has been said, and with some plausibility, if the kidney is much damaged by disease the urine will certainly show a deficiency of urea. Practically that is not so. Practically, with much pyelitis and dilatation, urea is sufficiently eliminated. Two half-kidneys, to speak roughly, will probably do the necessary elimination for the system in circumstances of quiescence, just as two half-lungs may suffice for a patient in very favourable circumstances; and failure to excrete urea is only manifest when the action of those two moieties of kidney is suddenly interfered with, by disturbance from external cold, &c., or by the inflammation propagated by means of an operation on the urethra or bladder. Practically, again, if I examine the urine of a patient in order to conditions certainly existed in five; and had it been possible to be aware of them the operation might not have been performed, and the patient might have lived a little longer, with much suffering, it is true, and he ultimately must have died at no distant period.'—*Royal Medical and Chirurgical Transactions*, vol. liii. pp. 136-7, 1870.

determine the amount of urea, and find it manifestly insufficient, is it not the fact that my patient must at that moment be to some extent in a condition of uræmic poisoning, and that he will certainly show some clinical sign thereof? Is not the fact that no such sign is present satisfactory proof that urea is sufficiently eliminated? Once the urinary constituents begin to be retained in the blood, the moment is at hand when symptoms of poisoning will appear. The chemical test alone must not be relied on in practice. When a patient passes an average quantity of urine of specific gravity 1018 to 1025, without casts, with no albumen except that which is due to the blood and pus found in the secretion, we have no ground for believing that any advanced organic renal disease exists, unless we obtain evidence of its presence from other sources.

Now, I never operate for stone without first ascertaining whether the condition of the urine is that above described; so that if I undertake an operation for a patient manifestly the subject of renal disease, it is in full view of that fact, and because it may be absolutely necessary that surgical relief must be attempted at all hazards. Of this I have to speak by-and-by. No one would be more ready than myself to obtain further aid from chemical tests. I only fear that none are known which can aid us to demonstrate the presence of the mechanical dilatation to which I have referred.

Again, it has been said, Can you not by palpation or percussion demonstrate the existence of this disease? I answer for myself distinctly, 'No.' A foreign authority demanding the utmost respect has recently affirmed that it is possible. With great deference, and after giving much special attention to the matter for some years, I emphasise my dissent on this point. I have long recognised this condition as one of the great stumbling-blocks, perhaps one of the greatest now existing, in our way to diminish the mortality after operations for vesical calculi of large size. Had I any means of certainly ascertaining that a patient *with such a stone* had ureters and kidneys largely dilated, I would advise him not to submit to any operation, and I would do all I could to prolong his life and make it tolerable—a condition within certain narrow limits to be attained. Something may be done under these

circumstances to accomplish this end—more, perhaps, than is often believed, of which I have seen some remarkable instances; but sometimes, it must be confessed, such palliative measures are useless, and the patient demands relief from sufferings which are intolerable, no matter what the risk may be. Can we under such circumstances humanely refuse him? ¹

To return, however: let us inquire what we can accomplish by palpation or percussion. First, I have determined the fact beyond all question, that there is by no means necessarily much, if any, tenderness in the regions of the ureter and kidney—that is, acute suppuration, active inflammation, or renal calculus not being present. You are accustomed to see how often I examine those regions in the wards. And you know how efficiently one may do it with a patient who is thin and spare; and also how particularly unsatisfactory is the examination when the patient is corpulent. Now the former condition is one you can by no means always reckon upon; on the contrary, I affirm that the latter condition must be more commonly expected in these cases. For a year or two, perhaps, the patients have been inactive, and fat has accumulated; and then you can learn little about the ureters by palpation. Again, the condition of the organs, even in the spare subject, offers no objective sign to physical examination. Let us suppose a ureter as big as the aorta, or larger still: Is it a tube filled with air like an intestine which will give you a corresponding note? Is it filled with fluid, and will it thus give you a line of dulness which may be traced? By no means; it is a flaccid sheath with thin yielding walls, transmitting fluid it is true, but you can no more isolate it by percussion from the adjacent structures, so as to demonstrate its size, than you can isolate by a similar process—let me say, the lumbar plexus. Of the kidney itself almost the same thing must be affirmed. You may, if fairly practised, determine the solid mass of an enlarged kidney; but there is no way of demonstrating the existence of a dilated pelvis or of

¹ The foregoing passage appearing like the rest of the lecture in 1873, is left without change. It belongs to the rest and to the circumstances to which the whole relates. I am still of opinion that a patient, known to have advanced chronic pyelitis with dilatation could be exposed to no greater hazard in the way of treatment than the operation of lateral lithotomy. But I should be sorry to refuse him the much better chance which a suprapubic section affords.

thinned kidney-structure by any physical examination. No doubt you may guess—shrewdly perhaps sometimes; but it is no place or time for guessing when life or death hangs on the decision. There is a field here for further research; the door is open for investigation. For, you may rely on it, no method of arriving at anything like a certain diagnosis of pyelitis with mechanical distension is at present known.

2. But I have now to consider what influence ascertained disease of the kidney exercises on the prognosis, when the subject of it has also a stone in the bladder, and the question of operating for its removal has to be considered. Let me first say that when the stone is small—the size of a small nut—whatever the condition of the kidneys, there is no very great risk from lithotomy if well performed. But we are not always so fortunate as to find the patient with a small stone. It may be large, and, do what you will, the patient is in a position of danger; the only question for us is—by what treatment will that danger be least?

I have operated certainly in three cases in which advanced Bright's disease was known to be present, but in which the sufferings of the patient were so great that an operation was deemed desirable. In each the stone was phosphatic; in the first and second it was large, in the third of medium size.¹

The first was a gentleman whom I saw with Dr. Sharpe, of Norwood, in 1865. With extreme care I removed the whole in eight sittings, with great relief to the patient. His urine, although fairly clear, was of low specific gravity, and charged with albumen. The subsequent part of his life—I believe about six or nine months—was rendered comparatively comfortable. The second case was in this hospital in 1870. He was also handled with the utmost caution, having five sittings in ten weeks, owing to the severe rigors and prolonged fever which followed some of them; but he went out marvellously improved, and lost all his calculous symptoms. I saw him three months after, and he fully maintained all he had gained. I have heard nothing since.

The last of the three occurred about the same time, also in the hospital. His disease was more advanced than that of

¹ By 'medium size' I intend always a stone which measures about an inch as the mean of its two diameters.

the preceding case. Only on his very urgent solicitation I consented to try lithotrity. I could not resist the appeal to diminish his suffering, if possible; that he must die at no distant time, both he and I knew. With his pallor, debility, and uniformly rapid pulse, lithotomy could not be thought of for an instant. I kept him three weeks before touching him, in the hope of improving his condition. Five sittings sufficed to remove nearly all the stone; but the last was followed by severe shivering and vomiting, and death in a few days.

Should I have done lithotomy in any of those cases? I answer unhesitatingly, in not one of them was it possible to submit, with any chance of success, the pale enfeebled patient to any severe cutting operation. Nothing but lithotrity could offer the slightest chance, and it saved two of them from the anguish of stone, and from the additional proclivity to death which it entailed.

But these, you say, were examples of known ‘*morbus Brightii*,’ and you naturally enough demand if I should be guided by the same principle in a case of mechanical dilatation and pyelitis if I knew beforehand that I had to deal with such a one. To this I can only say that the patients whom I have seen, and whose autopsies have demonstrated that they were the subjects of that condition, have been manifestly defective in vital power—patients for whom I should certainly shun a cutting operation of any kind if possible. Although, as I said on another occasion, had we the means of identifying an advanced example, I should gladly avoid either lithotomy or lithotrity, still I believe that I have employed the latter with success for a few. I have thus operated three times in cases of bad old-standing stricture of the urethra (maintaining the urethra well dilated by a catheter permanently tied-in for the purpose as you have seen), in which I have no doubt that considerable mechanical distension of all the passages existed. But these people were so miserably feeble that nothing would have induced me to cut them, nor do I think that any man would have ventured to do so.

But you might still rejoin, and you would be quite right in doing so, ‘Surely it has been said by surgeons of experience in the past, that when “renal disease” exists, it is better to remove the stone by one operation, although severe, than to

attempt it by a process which requires repeated introductions of a lithotrite, and more or less continued irritation from fragments?' The fitting reply to-day, as it appears to me, is, that although this was undoubtedly true some thirty years ago, it is by no means necessarily true now, when the relative capabilities of the two operations of cutting and crushing have so greatly changed. The operation of lateral lithotomy had been brought by long experience to its present position before lithotrity was invented. Its results are not more satisfactory now than they were many years ago. On the other hand, the perfecting of lithotrity has been a progressive process from fifty years ago to this very day; and thus it is that the axiom about renal disease, right as it might have been in past time, has been growing less so year by year. *I believe it is reversed for stones which may be easily crushed.* In support of this conviction I have called before you six unimpeachable witnesses—I might easily have called more—six patients who could not have been cut. To have placed those feeble and pallid frames on an operating table for lithotomy would have been to slaughter them outright. Of those six, five were saved. I believe, then, that for any stone of almost any size in a patient of broken health from advanced renal disease, if any chance exists from operation at all, it will be by lithotrity; and that in such a case lithotomy will be surely fatal. The choice in a bad case is lithotrity or palliative treatment; with a very large stone not easily crushed, it is lithotomy or palliative treatment, probably the latter.

But then it is impossible to overlook one condition, and it would be useless affectation to do so. I mean by lithotrity an operation carefully done by an experienced hand. Rather than have it done in any other fashion, let lithotomy be selected by all means. It is impossible to compare these two operations as we do some others—as we can, for example, any two modes of amputating a limb. Nor may we blink the fact that, while the lithotomy practice of one good surgeon may not differ greatly in the long run from that of another, it is impossible to deny that the lithotrity of the two may be wide as the poles asunder in its quality as an operation, and as to the chances which it may offer to a patient. Thus it is that a bold, well-performed lateral lithotomy is quite possible to

the young surgeon at the outset of his career, while nothing but considerable experience can make him a good lithotritist. The two operations can never be compared, nor their capabilities estimated, without keeping in view this fact. You whom I address had better, when in practice in the country, decide in difficult or doubtful circumstances to cut rather than to crush, until you have acquired some facility in the practice of the latter art, unless, indeed, the stone be quite small. Do not touch with the lithotrite in any circumstances a stone which is decidedly large until you have had experience with a small one or two.

Gentlemen, one great practical point remains, always recurs, and at last comes uppermost, on whatever side the great subject is considered. It is this: Detect the existence of a stone in the bladder early: it is always somebody's fault if not found early. The stone will then be small. It may be crushed at a short single sitting, and with almost no risk. No question of cutting need ever arise: the presence of kidney disease need scarcely trouble you. I have never lost a patient after lithotrity, when the stone was small; nor in such circumstances do I expect ever to lose one.

LECTURE XXIV.

EARLY HISTORY OF CALCULOUS DISEASE, AND THE TREATMENT
BEST ADAPTED FOR ITS PREVENTION.

GENTLEMEN,—We have had opportunities recently of studying together, and of examining very fully, the various operative proceedings which are generally practised for the removal of stone from the bladder; and you have had the opportunity of seeing them performed many times, not fewer than eleven cases having passed through my wards during the last three weeks, and that each has been brought to a successful conclusion.

But, satisfactory as such a result is, it is impossible not to feel convinced that there is still an important question in relation to the treatment of this complaint which has not yet been adequately answered. And it raises an issue not less weighty, nor less intimately affecting the patient's welfare, than any one of the subjects we have hitherto discussed.

The question I propose for solution is this:—

Is there not a period in the history of the process which leads to the formation of renal or vesical calculus, whether in the condition of gravel, concretion, or stone, at which it might be possible to prevent the development of a considerable deposit and the necessity for mechanically removing it?

Admirable as it must be admitted are the results of modern operative procedure, whether by the lithotrite or by the scalpel, and great as is the triumph which surgery has achieved in the art of removing stone from the bladder, I take it there are very few men who would not desire to avoid, if any means of doing so were available, the opportunity of personally illustrating these glorious successes of our craft.

There is not one among us, indeed, who would not infinitely prefer to be furnished with the means of controlling or

preventing the formation of calculus, on the first appearance of evidence that such a contingency is imminent or likely to occur.

I reply to the question before us, by a distinct assurance that we have the power to check the production of calculous matter at almost any stage of the complaint, and almost certainly to render it impossible, if proper treatment be adopted.

Before, however, entering on the details of the plan by which this result may be effected, I must first remark that there are, as you know, several varieties of calculus, and you may naturally ask, are all these equally amenable to treatment? For our purpose now, it suffices to regard all calculi as generally divided into two classes: those which have a local, and those which have a constitutional origin. By 'local,' I mean formed by diseased action in the bladder itself, and not depending upon any constitutional conditions or tendencies; and by 'constitutional,' I mean formed by some vicious action, some error of assimilation which has become more or less inherent in the system. Now, the large majority of renal and vesical calculi are of constitutional, and not of local origin. When they are local, we can do little to prevent their formation except by mechanical means. Calculous matter, the elements of which are produced in the bladder, may be washed out, or be broken or dissolved, and then washed out. But when stones are of constitutional origin—and we are going to refer entirely to these to-day—their component elements are separated from the blood, and no mechanical mode of preventing their production can by any possibility be available at this early stage.

Now, from observation, we know that nineteen out of twenty of such stones have uric acid for their basis, the remaining one in twenty being oxalate of lime;¹ and, less commonly still, there are phosphatic stones which are of constitutional origin also. Therefore, practically, to all intents and purposes, the problem before us is contained in the question: How may we best prevent the formation of uric-acid calculus?

Let us examine the early history of a case of persisting

¹ The deposits of oxalate of lime and of uric acid so often replace each other, that the consideration of the latter becomes practically generally sufficient for our purpose.

uric-acid deposit. First of all, let me say that, with some individuals in whom the tendency to manifest it is very marked, it is often more or less hereditary. As an illustration on the spot, let me recall the man we have just seen with uric-acid calculus in the ward, of whom we learned that his father had 'gravel or stone for the last twenty years of his life.' And it is by no means an unusual experience, that either calculus or gout—more commonly the latter—has been observed in the family of the patient who comes to us with one of these formations in the bladder. We speak of tubercular disease and of cancer as being transmitted by blood-relationship, especially the former; but it is probably not more strongly hereditary than the disposition to uric-acid deposits in one form or another. I have made a point of asking the question of all patients who come to me with this complaint; and although I cannot furnish you with an exact numerical statement, I do know that in many, either gout or gravel (for I wish to show you the identity in regard to origin of these two complaints) has existed in the preceding generation. This hereditary tendency varies in force or strength in different families. You will find some persons with persisting uric-acid deposits at thirty years of age or sooner, others at forty, others not until sixty. Of course, the earlier the age at which it appears, the stronger you may infer the hereditary disposition to be, and the more obstinate, probably, will be its tendency to persist.

What, then, are the first signs of this condition in the patient? The first thing which excites his attention, usually, is the frequent occurrence of a pinkish deposit at the bottom of the vessel in which urine has stood, often staining the surface more or less. Or, the secretion, passed originally perfectly clear and healthy in tint, has become thick and opaque (sometimes almost resembling a mixture of rhubarb and magnesia) soon afterwards. Or sometimes a delicate film or pellicle appears, and covers it, exhibiting a faint play of prismatic colours. In fact, these changes occur on the cooling of the urine under certain conditions. These phenomena therefore may appear more frequently in winter than in summer, because the external temperature is lower. The change consists in a deposit of salts from a hot solution, as the liquid cools; the deposit being easily re-dissolved by raising the

temperature of the urine to that at which it was originally passed, when it regains also its original transparency. The condition here described very often and very unnecessarily excites much anxiety on the part of the patient; but only a very marked and persisting condition of it can be regarded as a sign of what by some is called 'the uric-acid diathesis.' Mind, I mean strictly persistence, or at all events frequency of occurrence: for you or I, with no hereditary predisposition, may take a little more beer, or a heavier dinner, than usual, or an extra glass of champagne, or a glass or two of extraordinary port, and may find next morning a considerable quantity of this pinkish deposit, or the urine looking almost like pea-soup, but not so thick, and when the vessel is tilted on one side, a tidal mark, so to speak, is seen, showing the height at which the liquid stood; all this, as I said before, being re-dissolved by heat. The same condition may occur also after unusual exercise which has produced abundant sweating, so that only a small quantity of water is available in the system for the solution of the urine salts, and the secretion is high-coloured, and contains an unusual proportion of solids. In either case the opacity of the liquid, as well as its tint, which may vary from fawn to dull red, are due to the unduly large production of the mixed urates; that is, urates of soda, potash, lime, &c. But if, without any errors of diet, among which any but a very small allowance of alcoholic drink is only one, a patient habitually passes this kind of urine—if in time there frequently arrives also a deposit of uric acid, manifested by the presence of little crystals, looking like particles of cayenne pepper, or red brick-dust, at the bottom of the vessel—when this occurs rather early in life, say before forty, we cannot doubt that there is an undue tendency to produce uric acid, either inherited or acquired. For this tendency may no doubt be acquired, or a pre-existing habit may be intensified; indeed, it is often the result solely of improper diet and regimen. I now show you a specimen of urine quite cloudy with mixed urates, although you must be familiar with it in the wards, and also with the fact that on heating the liquid it again becomes clear, and that in a short time, while we are talking, if the room is cold, it may again become cloudy on cooling. Let me once more remind

you that this may occasionally happen with the most healthy individual; and it is only the persistence of the symptom, without any flagrant errors of diet, which should lead you to suspect it to be a constant condition that requires treatment.

We have followed the complaint up to the formation of cayenne pepper crystals. Of this deposit I have some very good specimens here, which have been collected from patients who passed it habitually. These consist mainly of the transparent rhomboidal uric-acid crystals, which you know to be very beautiful objects under the microscope. They may be passed almost daily and habitually by some persons, and without any sense of discomfort, or occasion for complaining. Other persons may pass this material periodically in large quantity, little or none of the deposit being observed during the interval. At such periods, the patient often experiences pain in the back, or over one hip, with uneasiness extending to the groin and testicle, all this perhaps accompanied by sickness or nausea; and he may then be said to have a mild attack of sand or gravel. He feels relieved after the occurrence, which, just as a storm is said to clear the air, has freed him for a time from the effect of accumulation of morbid matter in the system. Sometimes, however, the symptoms are much more severe, and are often then believed necessarily to denote the passage of a renal calculus. But I have satisfied myself, after very large opportunities of observation, that in the great majority of these attacks, the patients have been merely the subjects of a 'uric-acid storm,' if I may use the expression; and that calculous matter has been eliminated in a soluble condition, although the process has been accompanied by pains sufficiently severe to arouse the suspicion that some concrete form of gravel has been passed, or has, at all events been formed. These phenomena occur at varying intervals, and usually become more frequent or severe, unless the patient does something to prevent their occurrence. Subsequently, he may pass tiny calculi, which have the appearance of being rounded, or, at other times, rough and irregular aggregations of the same crystals. Or at a later period these bodies tend in time to become larger, as large as small peas, or even beans; still specimens of the same product—that is,

of uric acid, associated more or less with an alkaline base such as those above named. Their transit from the kidney to the bladder may be accompanied by excruciating pain in the regions already mentioned, and by severe vomiting, lasting a few hours; after which relief often occurs somewhat suddenly. At the same time there are many large specimens of such 'gravel' or small calculi passed without the patient being aware of the fact until he sees them excreted. Indeed it is by no means unusual, even in those instances where patients have voided such small bodies for a period of several years, that no pain or other sign of their existence is observed throughout. Where, however, the transit of the calculus is painful or difficult, some signs of it are generally manifest in the urine. Sometimes it is scanty, and merely very high coloured; at others it is tinged with blood, and not uncommonly it deposits blood in that dark form which is described as resembling 'coffee grounds.'

Here, let me recall for one moment what I said as to the relation between gout and uric-acid deposit. I have sometimes seen these two complaints alternating, comparing one generation with another; gout, in its ordinary form of attack in the great toe, appearing in the one, gravel in the second, and gout again in the third. But the same individual may also have alternating attacks of gout and gravel. I have seen a patient who had suffered for years from gout become free from his attacks without known cause for several months, when he developed for the first time a uric-acid stone in the bladder. Lastly, the so-called 'chalk-stones,' which you have often seen infesting the knuckles and disfiguring the hands of elderly people in advanced stages of gout, are composed of the same material—that is, of uric acid, usually as urate of soda. The identity of gout and uric acid gravel, then, is unquestionable; they constitute two different series of phenomena, but both spring from one and the same root.

Now, what is the best mode of dealing with those patients who habitually pass the cayenne pepper crystals of uric acid, or the small calculi? What mode of treatment will help to prevent the arrival of at least the advanced condition—namely, that of calculus too large to be voided by the patient? Generally speaking, I think such patients come under observation

in a tolerably early stage, although it is obvious this is by no means always the case. Some are unnecessarily alarmed at a very early period, when the urine is only occasionally thick with urates. They are apt to mistake the opaque secretion for some important manifestation of morbid matter, and to become greatly disturbed in consequence. Indeed, some patients become almost hypochondriac through not knowing that such deposits are of little consequence at first, and can be easily treated. It is necessary to correct these false impressions, and explain the nature of the product, that in itself it is not a diseased one, only a normal constituent in larger quantity than is desirable. They should be made to understand that the original and normal form of urine is a more or less crystalline solid, that it is indeed passed thus by many animals ; while in others, like ourselves, it must be first converted into a solution for convenience of storing in a bladder. This solution, then, owing to irregularities in diet, &c., occasional or habitual, varies in strength ; and sand, gravel, or calculus can only be formed when the solution is maintained by undesirable circumstances in a too concentrated state. The urine is then generally found to be very acid to tests : of course, uric acid being in large quantity, that condition is a natural sign of its presence. It is little the worse for this perhaps ; the bladder mostly tolerates a urine of full acidity quite as well or better than a neutral one. Nevertheless, the presence of a full proportion of acid has come to be regarded as sufficing to establish a principle, somewhat a crude one, of treating the complaint ; and one almost universally adopted. In the circumstances described the patient has generally been prescribed the continuous use of alkalies. While, on the other hand, and with even less reason for such a course, when the urine is neutral or alkaline, mineral acids are persistently administered. This simple—indeed, too simple—view of the matter often dominates the whole of the treatment. In the former case, a certain quantity of potash, bicarbonate or citrate, or of soda, or of lithia ; or benzoate of ammonia is administered for a long period ; or the natural waters of Vichy, Evian, or Vals (carbonate of soda), Contrexéville (sulphate of lime chiefly, with carbonate of soda), or some other alkaline spring, are largely given ; or the patient is perhaps sent to

drink the waters on the spot, there or elsewhere. The chief alkali is, as you see, carbonate of soda; whatever, however, be the form of it, provided enough be taken, these deposits will disappear; the uric acid will no longer be deposited; the urine will become less irritating; the annoying symptoms will be diminished or got rid of. And of course the patient is very much pleased with this new condition of clear urine and disappearance of all deposit. And you may naturally say, 'What more can be desired?' Much: you have merely made his enemy disappear; he is by no means rid of its presence, for you have not checked the acid formation. The uric acid is there, and probably in quantity as much as ever; for the uric acid and urates are soluble in alkali, and you have only rendered them invisible. You really have the same condition as that described in the well-known fable of the ostrich, which is said to put its head into the bush when pursued by hunters, and, no longer seeing them, to believe itself secure. Just such is the security of the patient with uric acid who trusts solely to alkalies or to Vichy water. His surplus deposits have become unrecognisable by vision; nothing more. I do not go so far as to say the alkalies have been absolutely unserviceable as regards his constitutional state, but they will not improve it to any great extent; and when he leaves them off the acid shows itself again. And further, I believe there is reason to conclude that large quantities of alkali, habitually taken, exercise an undesirable influence, to say the least.

Diuretics have been employed on much the same principle, and may be regarded as no better than the alkalies. In those cases which are treated with such agents as nitrate or acetate of potash, &c., the secretion of water is no doubt increased *quoad* the amount of solids, and the solids are thus dissolved. The same thing happens with that remarkably general and always popular diuretic, so punctually and faithfully swallowed by the patient who has once obtained any medical sanction for its use—I mean gin, or whisky and water. In all such instances, what has chiefly been done is to stimulate the kidneys, already perhaps overworked, to do more. You have by no means cured the patient of his gravel, and may be happy if he is no worse for the remedies.

I shall endeavour to give you a sketch of such views as I have been able to form of the pathology of these cases ; and, speaking now with more confidence, I shall be able to point out an efficient mode of treating them. The problem they present has been brought before me with great force and frequency, since for many years my advice has been urgently sought by the calculous patient, after operation, as to what he should do to avoid becoming the subject of another. And many others in the early stages have sought similar aid, naturally feeling that the subject must have engaged my attention, in the earnest hope that they might escape the advanced stage.

Using then only broad and simple terms, as our time here and, I may perhaps add, the extent of our knowledge will not permit me to be more minute or exact in detail, I shall premise that the origin of those well-known symptoms which all agree to recognise as gout, as well as of a superabundant uric-acid deposit in the urine, is due to defective assimilation on the part of organs associated with or forming the *primæ viæ*. I am quite aware that it is common in practice to speak somewhat confidently of the liver, its action, and its states, although we have probably still much to learn about these. Many years ago it was the custom to talk and act as if we were thoroughly acquainted with the liver and its functions ; but during the last fifteen or twenty years new light has been thrown upon the subject by the laborious researches of Bernard, Pavy, and others, and we have thereby learned how little we certainly know of its natural functions, still less of its action in disease. Thus, in the department of practical medicine, all were agreed that if there was one fact more obvious than another—at least since the time of Abernethy—it was the specific influence of mercury on that organ. Nevertheless carefully conducted inquiries render it doubtful whether the secretion of bile, at all events, is influenced by this agent in any degree whatever. There were other drugs, indeed, which were vaunted to take the place of mercury, yet always following at a humble distance, so to speak ; but no one ever thought of disputing the fact that you could augment at will the bile secretion by administering that famous specific. I am not here to say whether that is so or not, but it seems

to have been proved that there are substantial grounds for challenging our ancient faith in the doctrine so expressed. Observe that I have said nothing to underrate the value of the medicine in regard of symptoms popularly associated with defects of some kind in the liver.

Bear in mind, then, that in speaking of the ‘defective action of the liver,’ or of ‘torpor of the liver,’ I merely use provisional terms, which most will easily understand as indicating more or less distinctly a certain set of symptoms. Let them be briefly described as mainly consisting of a constant, or almost constant, deficient excreting function by the bowels, sometimes, but by no means always, associated with impaired appetite, perhaps headache, nausea, depression, inactivity, and other signs of slow or uneasy digestion; some of these being absent if the diet is carefully selected, or if the patient lives in the open air and takes much exercise. On the other hand, not only the deranged digestion, but pains in the back and limbs referred to as muscular, may be frequently present. I cannot positively state whether those phenomena are really due to inactivity of the organ in question; practically, for us to-day, this does not signify much, but the current terms are still convenient formularies until better ones can be substituted for describing the condition in question.

Now, at the bottom of this tendency to uric-acid production there often lies what is thus understood as inactivity of the liver; and the true rationale of the unduly large formation of the urinary salts appears to be, that the liver together with the skin or some other organ performing inefficiently its excreting function, the kidneys have more work than is natural thrown upon them. Thus the solid matters of the urine, or rather some of its ordinary constituents, are augmented—not all of them, for urea is not necessarily increased, but uric acid is largely produced, and is eliminated not only in solution but in crystalline forms. Uric acid is very insoluble in water; and although the quantity thrown out may be quite soluble at the natural temperature of the urine (99° Fahr.), when this diminishes to 60°, 50°, or 40°, the acid is deposited, and when the quantity becomes larger still, even the ordinary amount of fluid associated with it at a temperature of 99° will not suffice to dissolve the whole, and solid uric acid is deposited

in some part of the urinary passages. This deposit may take place in the kidneys themselves, giving rise, if not thrown off, to the formation of calculus, at first renal, but sooner or later generally becoming vesical. Now, if all this be so, the formation of uric-acid gravel is not by any means to be regarded as necessarily disease of the kidney; on the contrary, it may be regarded as the result of an active and capable organ vicariously relieving some other organ the function of which is torpid. The true remedy, therefore, is not to stimulate the kidneys, already overworked, by diuretics etc.—not, to use a familiar simile, to lash that horse of the team which is already doing too much work—but you are to seek the cause in that other one of the team which is doing deficient work, and that is, either in part or wholly, almost invariably the liver, in the sense already explained.

The treatment, then, which I advise you to pursue is to employ such agents as will stimulate the excretory action by the *primæ viæ* without depressing vital power. No doubt that a powerful agent for the purpose is mercury; and it is quite unquestionable that relief of the symptoms above alluded to is to be obtained in a remarkable manner by occasional small doses of that agent. For our purpose, however, it is not always necessary to use it, and there is a widely spread belief, grounded, in my opinion, on the reckless mode of administering the drug commonly followed in the early part of this century, that it is mostly injurious or dangerous, and to be discarded if possible. No such objection at all events lies against another class of remedies, the prolonged use of which has been of great value, I mean certain kinds of natural mineral waters. These I regard as greatly superior for the cases in question to taraxacum, nitric acid, podophyllin, the alkalies, and other vaunted ‘substitutes for mercury’ as they are termed, in what is called ‘promoting the action of the liver.’

Now the mineral waters which I am about to describe belong to a group of springs marked by a common and distinctive character, since all contain in solution sulphate of soda in considerable quantity, together with a varying proportion of sulphate of magnesia, besides less important salts. In studying these waters I wish you to observe with me the

composition of them, and at the same time to dismiss to a certain extent from your mind the estimate of medicinal doses which you have acquired in the dispensary, and which necessarily belong to it; since small quantities of drugs as they exist in mineral waters act more freely than the same quantities combined after the ordinary pharmaceutical method. You ask me for a demonstration, and I am quite ready to give it you. At the same time, let me caution you against regarding the small doses of mineral waters as having any affinity, either in the matter of quantity or by the principle which regulates their administration, with what is understood as an 'infinitesimal' dose. The difference may be illustrated thus: you know that you may give to A an ounce of 'Epsom salts' (sulphate of magnesia), or to B half an ounce; for individuals are very differently affected, and each is probably freely purged; but the same effect will be obtained with one-third or one-fourth of those quantities if the patient takes it as prepared in Nature's laboratory—that is, in the form of mineral water. It is a curious fact, which I give as an ultimate one, and without speculating here on the cause of the difference. As a proof of the superior force of the saline combinations found in natural springs, I may refer you to the following experiment. If you will reduce by careful evaporation, as I have done, such mineral waters to their pharmaceutical condition of crystallised salts, you will find that they possess no more power than similar salts obtained by the ordinary commercial processes, and met with in every chemist's shop. Having been separated by evaporation, they no longer act with the energy which belonged to them when in the state of solution which the natural spring produces. You will therefore readily understand that it may be essential, at all events that it is desirable, to employ the natural mineral waters; since what are called 'artificial waters,' however admirably prepared, are simply pharmaceutical products, and are destitute of a remarkable quality which distinguishes the remedies they are designed to imitate.

Here is a table of the waters which I refer to, with a comparative synopsis of their distinguishing saline contents, representing the number of grains (without estimate of the chloride of sodium and other less active agents which are also

present) in an English pint. Below these I add two well-known alkaline waters.

	Sulphate of Soda	Sulphate of Mag- nesia	Carbo- nate of Soda.	Other Ingredients
<i>Saline :</i>	grs.	grs.	grs.	
Püllna	154	116	—	
Hunyadi Janos	150	148	—	
Friedrichshall	58	49	—	} Little iron
Marienbad (Kreuz) . .	48	—	9	
Carlsbad (Sprüdel) . .	25	—	13	} Little iron
Franzensbad	30	—	6	
<i>Alkaline :</i>				
Vichy (Célestins) about .	3	—	47	} Little iron
Vals (Madeleine) about .	—	—	65	

The most concentrated water of the saline group is that of Hunyadi Janos, a Hungarian water which contains about two and a half drachms each of sulphate of soda and sulphate of magnesia in an English pint; next, and nearly equal to it, is that of Püllna, which contains 154 grains, or about two and a half drachms, of sulphate of soda to the pint, and nearly two drachms of sulphate of magnesia.¹ Those quantities of the commercial salts would give a tolerably efficient purge to most persons. But you must not give a pint of these natural waters to anyone; five to seven ounces would be a full dose. I do not like Püllna generally for our purpose, because it purges too freely, often gripes, and is very nauseous; Hunyadi Janos is less so. Half or two-thirds of a drachm of sulphate of soda and half a drachm of sulphate of magnesia in a natural

¹ The large demand which has arisen in this country for the 'bitterwassers' or natural aperient waters of Germany has, of course, led to the appearance of new varieties. Thus, more powerful and so-called 'richer' products have come into the market. It should be known that the increased proportion of the aperient salt to the water in which it is dissolved is caused by artificially evaporating the product of the spring. Thus a constant quantity of the solids is maintained by carrying evaporation to a fixed point, determined by the specific gravity of the solution. Water having been thus artificially removed, there is no objection to the addition of a considerable quantity of hot water to them when used here, for the purpose of diluting the solution, but chiefly for raising the temperature to at least that of the interior of the body, a condition which appears to render their action more certain and prompt.

The difference in the composition of these waters is not great. Those that contain the largest relative proportion of soda sulphate to magnesia sulphate are, I think, superior for the purposes referred to above.

mineral water is an average efficient aperient for a man. Supposing that we order Friedrichshall, which contains not a drachm of sulphate of soda in a pint, and little more than three-quarters of a drachm of sulphate of magnesia; yet nine or ten ounces make an efficient purge; for many persons six or seven suffice. I think I may say that seven or eight ounces is for the adult an average dose; it should be warmed and diluted by adding, say, a third or a half of its bulk of hot plain water. But I know no difference between this and Hunyadi Janos except that of the latter two thirds of the quantity named is an equivalent dose, and is more convenient in consequence. If then a dose of either be taken in the early morning, an hour before breakfast, which should be a light meal, but comprising the cup or two of hot fluid usually then taken, a full, free action of the bowels will probably follow soon after; perhaps two. That quantity, you see, would contain about twenty-five or thirty grains of sulphate of soda and twenty or twenty-five grains of sulphate of magnesia, which administered in any combination you please from a druggist's drawer, would have little appreciable action; the patient might be uncomfortable perhaps, but there would rarely be any marked action of the bowels. To repeat what I have said: if you evaporate a quantity of Friedrichshall or Hunyadi Janos water in a warm water bath so as to avoid decomposition of the salt, and retain the water of crystallisation, thus obtaining as perfect a product as a chemist can produce, and administer three times as much of this salt as that which exists in a dose of the natural water, you will probably not produce such efficient or certain results as the small quantity contained in the natural water ensures. So that there is something, which I do not pretend to explain, and certainly shall not speculate about here, which distinguishes the action of mineral waters from the action of salts which are made by our pharmaceutical processes. I may appropriately remark here also, that the action of the aperient bitterwasser on some persons is such, that the longer it is taken the smaller is the quantity necessary to attain its object. If, for example, six or seven ounces taken in the morning with, say, four ounces of hot plain water, produce one movement of the bowels immediately after breakfast, the next morning five ounces, and

a morning or two later three or four ounces will do the same ; and it is not improbable that at the end of ten days or so, three ounces or thereabout will produce the desired effect.

The next water on my list is that of Marienbad, and it contains forty-eight grains of sulphate of soda in the pint, with nine grains of carbonate of soda, no sulphate of magnesia, but a small quantity of iron. With these constituents, there is enough free carbonic acid to make it an agreeable and slightly sparkling draught. Rather more than half a pint produces for most persons an easy motion. If this water is exposed to the air for a day or two, there will be a brown deposit of the iron ; it is indeed to be regarded as a slightly ferruginous water, although this character is not an important one. It is a very admirable form for many persons where the action is not required to be considerable ; while the presence of iron, and of carbonate of soda, is an additional advantage for some. The only drawback is the need that it should be obtained in a fresh condition, for it bears transport badly, soon losing its carbonic acid, and depositing its iron, and thus becoming less palatable and light for the stomach. This difficulty has been partially overcome of late by the use of better bottles, and by the increased demand which is gradually arising for it.

Thus much for the saline aperients. We now come to the water of a very famous spring, that of Carlsbad, which is credited with the possession of a quality or influence, conventionally denoted by a somewhat vague term, 'alterative,' being undoubtedly useful for patients who habitually consume more food than the system and its activity demand, and who manifest as a consequence obvious signs of superabundant uric acid deposit. The patients, however, should be fairly robust ; feeble and excitable persons are usually depressed and injured by Carlsbad. There are several sources there, all of which contain about twenty-five grains of sulphate of soda, and thirteen of carbonate of soda in the pint, and, contrary to common belief, are identical in their chemical constituents and proportions. They differ from each other solely in point of temperature, which is very high in the Sprüdel, the central source, and in the remotest is higher than that of the human body. Carlsbad water is often supposed to be purgative, but it is not so unless taken very largely. No quantity ever given

here exerts a laxative action on the bowels. The influence it exercises on the animal economy, although probably chiefly due to the sulphate of soda element, is not in any way as an aperient. The 'Carlsbad Salts' (which are widely and popularly known as an aperient, but are sold at an exorbitant price, bringing a great revenue to the Carlsbad makers) are simply sulphate of soda, or 'Glauber's salts' (with perhaps a trace of carbonate), and differ in no respect, except in name, from that common but valuable aperient as made here at home and in other countries. My belief, after a long and large experience of the employment of Carlsbad water in this country, is that in most instances it is more useful here than when taken at the spring itself. This I will explain presently.

Next to be named is the water of Franzensbad, which contains thirty grains of sulphate of soda, six of carbonate, and a little iron, which Carlsbad does not. That closes this group of springs.

Next I shall just point out the distinctive characters of the alkaline waters which are so popular in this country. First and best known is that of Vichy, which contains only three grains of sulphate of soda, but nearly fifty grains of carbonate of soda, in the pint—a powerful solution. After that is the water of Vals, which is also from the volcanic district of France, some of the springs of which contain upwards of sixty grains of carbonate of soda in the pint, and nothing else worth mentioning. These two waters are extremely famous, and their sources are much resorted to by patients for the cure of gout and gravel. The waters are also largely exported to other countries. Another alkaline water is that of Evian, on the south shore of the Lake of Geneva, which I name here because it has a certain reputation as a resort for calculous patients. The alkaline constituent, carbonate of soda, is present, however, in much smaller quantity than the preceding, and this spring ranks, as regards the influence of that agent, below the others named.

Contrexéville and its water have of late been more recommended, especially by the profession in Paris, for calculous patients. No doubt some alleviation of symptoms is thus obtained by certain patients; but the constitution of the water, which depends for its alkaline action chiefly on a salt

of lime, renders it an undesirable agent for the object we are now seeking to accomplish.

Under the continued daily use of strong alkaline waters, the uric-acid deposits disappear—that is, they are dissolved by the alkali. Inasmuch, also, as this appears to have some beneficial action on the liver, a certain degree of benefit is perhaps also attained. Thus such patients are often better for a time after a visit to Vichy; but, as a rule, are not permanently benefited. I am satisfied, after observation on the spot, and also of the effect of the waters taken here, that they only temporarily mitigate the complaint, and do not cure it. Now, the principle upon which the waters of the sulphate-of-soda group, aperient and non-aperient, are beneficial is, that they produce activity in all the digestive functions, stimulating the excretory action of the abdominal organs, so that certain waste matters which have been hitherto thrown out as uric acid by the kidney are eliminated in some other form. If therefore it is really desirable to recommend resort to a mineral spring as treatment for uric-acid deposits, I should prefer Carlsbad, and certainly never send a patient to Vichy, Vals, Evian, or Contrexéville. And when a stout active man, whom it is most desirable to separate from his home engagements and business cares, requires a Carlsbad course, he may often visit the locality with advantage. At the same time, as I have already intimated, I firmly believe that it can in the majority of instances be more successfully pursued at home, provided certain concomitant advantages can be secured, than by sending the patient abroad. Thus it is desirable to secure, during a course of waters at home, at least regularity of meals, scrupulous attention to diet, and to select a time when, particularly in the case of business men, less of anxiety and of need for overexertion than usual, may be expected. Granted these conditions, there is one advantage in the home course which outweighs much of the special value of a course on the spot. The patient who stays at Carlsbad three weeks, very rarely four, is made to consume far too large a quantity of water in a given space of time. The quantity in itself is probably not too much for his needs; but it is more efficacious, and is less exhausting in its effect on the patient, to devote two or three months to the task than to swallow the whole

within the brief term named. It is the apprehension of this fact which has made me so warm an advocate for the systematic home use of these agents, at all events for the class of cases which we are here considering. There are some other maladies for which Carlsbad is recommended, but relative to these it is not my province to offer you any opinion here.

But I shall now endeavour to illustrate with more detail the manner of administering the waters which I have pursued and now advise.

A patient seeks your aid, on account of a series of severe renal attacks occurring at considerable intervals of time, after one or two of which he has passed small pisiform calculi of uric acid. His health may appear to be otherwise good. On the other hand he may be also troubled with some indigestion; in either case he is very likely more or less constipated; and you will probably find that, relatively to his activity of life, his amount of food and stimulant are somewhat excessive. I advise you to give him at the outset half a grain or a grain perhaps of blue pill with three or four grains of the compound extract of colocynth at night, followed next morning by six or eight ounces of Friedrichshall water, or half that quantity of Hunyadi Janos, taken with a little hot plain water. Then, on each succeeding morning, let him take six ounces of Carlsbad, with about two ounces of Hunyadi Janos, and four of hot water daily, say until the end of the first week. If the bowels are not moved at least once easily, soon after breakfast, increase a little the quantity of the aperient water; if, on the contrary, there is more than gentle action, diminish the dose. I then usually order four, five, six, or seven ounces of Carlsbad every morning, according to the patient's condition and temperament. If he is delicate, irritable, more distinguished by activity than by force, his occupations demanding intellectual rather than muscular exertion, the smallest amount may amply suffice. If he is a robust countryman, taking much physical exercise in the open air, the largest quantity may be a moderate dose. For two or three weeks or thereabout, the waters may be taken every morning; after that, every other morning for another month or more, and so on according to circumstances. The Carlsbad should be the chief agent throughout, but since it has no

aperient action, with some people appearing rather to induce constipation, and as moreover the presence of the water in the system, for a few hours after taking it, sometimes seems to cause uneasiness and to be injurious rather than the reverse, it is desirable for a large proportion of patients to add a little Hunyadi Janos, just enough to induce one gentle action of the bowels after breakfast. The quantity of this must be decided by each individual according to his own experience of its effects. When the bowels act freely without it, as occasionally happens, the Carlsbad may be taken alone; and in all cases it should be heated. At the source it is too hot to drink, and is allowed to cool slightly; and when it is taken here a little hot water may be added, or it should be raised in temperature to 90° or 100° , by placing the tumbler containing it in a vessel of hot water for a few minutes.

I have largely and systematically employed these agents for about five and twenty years, modifying the quantity and the mode as experience has indicated, and the system thus briefly described is the result of it. After a course of six weeks or so, it may be repeated with advantage for many patients, after an interval of three or four months. Meantime, as an occasional aperient and as a corrector of digestion in these cases, few things are better than the aperient waters named. I referred just now to the well-known 'Carlsbad salt' as being often used in the belief that it represents Carlsbad water; on the contrary, it consists almost entirely of sulphate of soda taken from the water, and has just the same and no more virtue than that salt when obtained from any other source. But sulphate of soda is one of the most admirable medicines we possess, and deserves to be more popular than it is. I have constantly ordered it, with or without a small addition of sulphate of magnesia, for the out-patients of the hospital, as the best substitute within their reach for the mineral waters in question.

There are many cases, especially those in which the patient has been in the habit of consuming more food, and especially more fatty material, than he has been able to assimilate, for which a few small consecutive doses of blue pill may be most usefully employed. I am quite satisfied in most instances with an eighth of a grain combined with two or

three of the compound extract of colocynth, or with four or five grains of compound rhubarb pill, taken every third, fourth or fifth night, during the former part of the course. Many persons in whom doses of two or three grains of blue pill cause painful depression derive manifest benefit from the small quantity named. If anyone whose habits or condition have occasioned beneficial recourse to the remedy doubts the effect of an eighth, a twelfth, or even a twentieth of a grain of blue pill, let him try the ordinary five-grain compound rhubarb pill, with and without the fractional addition, and the difference will be easily understood and appreciated.

And smaller doses even than these are of great service when habitually taken for a short time by some of these patients who have been the subjects of indigestion. Heavy feeders, large consumers of animal food are little affected by such minute quantities. But when the habit of living largely on cereals, vegetables and fish, with perhaps game and poultry, and little or no meat, has been acquired—which, as we shall soon learn, is a powerful means of checking uric acid deposit, and rendering the individual hitherto affected by it not only free from his local troubles, but stronger and healthier than before—the minuter doses referred to act with ample effect.

Of this system of treating a constitutional tendency to excrete uric acid in abnormal quantity, whether in the form of calculus, or by the less obvious course of gouty attacks in all their varied manifestations, I cannot speak too highly. I know no results in my entire personal experience of practice which have satisfied me more, or have better earned a right to be considered successful, than those which have been thus attained.

But the important subject of the necessary dietary and hygiene for these cases must now be deferred to the next lecture.

LECTURE XXV.

THE DIETETIC TREATMENT OF PATIENTS EXCRETING URIC
ACID IN EXCESS.

GENTLEMEN,—A growing experience of man and his needs, and especially of that class of our fellow-creatures who on account of some defect of health come under professional observation, has increased my sense of the importance of studying closely the subject of diet and digestion in relation to their ailments whatever they may be. Emphatically a surgeon, I nevertheless find that subject full of interest, and, what is more, believe an acquaintance with it to be the necessary complement of surgical tact and prowess: inasmuch as the right understanding and management of the stomach and its wants, in a sick-room as well as out of it, conduce largely to the success of operative treatment. I request you, therefore, not hastily to conclude that I am quitting to-day—no, not in the smallest degree—the surgical track which is my department here, but, on the contrary, that I am distinctly and essentially remaining within it. Hence it is that for the first time I take the course of extending the remarks on diet which formerly occupied but the latter third of a preceding lecture, for the purpose of expounding my views thereon more fully than heretofore.

You will recollect that, in considering the early history of calculus, I suggested to you a point of view from which the patient excreting uric acid in excess might be regarded, and at all events successfully treated, chiefly through the influence of certain natural mineral waters containing sulphates of soda and magnesia, which act primarily on the organs of digestion. And it is therefore only natural to suppose that the right regulation of the diet of these patients must accompany the medicinal treatment. Indeed I am quite satisfied that in

nineteen cases out of twenty, probably in a larger proportion than that, an undue deposit of uric acid will disappear under a proper dietary. At all events, the formation of it in calculous masses can be prevented, and the patient spared the pains and the anxiety connected with their production and appearance. I think as much may be said of oxalate of lime deposits.

It was formerly held that when a patient excreted uric acid superabundantly, the obvious and chief course is to diminish considerably the nitrogenous elements of his food, since uric acid contains a large proportion of nitrogen. But this very simple view of the matter will not furnish the secret of successful treatment, as the endeavour to realise it in practice has long ago demonstrated for myself, and a like conviction must also have arrived to others. For many years past I have pursued a widely different course, and with results which warrant the statement just made.

Speaking then in general terms, the two classes of food which it is necessary to eliminate from the dietary of those who have been excreting uric or oxalic acid abundantly, but especially the former, are, fatty matters, and saccharine products of all kinds: the former not entirely, the latter as completely as possible. Next, alcoholic drinks should be forbidden, or, if permitted in some exceptional cases, should be taken only in very small quantity. Let us get rid of this subject first before proceeding to that of food properly so called. There is no doubt whatever, that the great majority of these patients are better without fermented or spirituous liquor in any form. Its habitual use for healthy persons is undesirable and injurious as a rule, to which there may possibly be a few exceptions in this world of infinitely varying conditions. And for patients with impaired digestive power it is usually still less desirable. For those who have the symptoms before described as depending upon a 'torpid liver,' alcoholic drink of any kind is, I believe, invariably pernicious; its daily use in very small quantity creates the condition so termed for thousands, and is the cause of an infinite number of chronic cases of obstinately recurring, although slight, 'sick headaches,' 'bilious attacks,' as well as much of the malaise, and incompetence, mental and bodily, attributed to a slow digestion.

But after long indulgence even in a small quantity of alcoholic stimulant, many a patient misses it exceedingly, and when commencing a habit of abstaining arises from a meal, however ample, complete and varied in the matter of provision, with a sense of dissatisfaction only to be appeased by that little modicum of liquor which has been absent. Of course this is the expression of a want artificially created, and it is very hard to stifle that craving. It will make itself felt for months perhaps—I speak of exceptional cases—and explains many of those in which an individual tells you, ‘I tried total abstinence for six weeks, or two months, and found I could not stand it.’ I will even concede that for a time he may have digested less easily and profited less by his food than he did when he took the stimulant; but this condition you may assure him will continue only for a time. Perseverance in abstinence, with a rarely permitted recourse to relief in unusual circumstances, will be rewarded in the course of a few months. Three, four, or even six, may pass before the digestive functions will regain their normal power apart from the artificial stimulus, and then they work better than before; and thus the patient reaps, if he faint not, the reward of his well-doing. When you admit some compromise in the matter, generally advise a sound light wine, the ordinary produce of the Moselle if possible; in its absence, a mild Rhine wine, or (now more difficult than formerly to obtain pure of common table quality) Bordeaux. But certainly forbid most champagnes and other effervescing wines, as for the most part imperfectly constituted, and always bad if containing much of the sweet compound often largely added and known as ‘liqueur.’ The stronger wines, as sherry and port, are always unsuitable, and strong beer is to be absolutely forbidden. Very light bitter beer, or sound cider which is neither sweet nor acid, is preferable to any of these if any alcoholic stimulant is to be taken. They might be so made in this country as to be at all events as wholesome as any wine wherever it comes from. It is a pity we do not produce here a very light alcoholic beverage from malt and hops which might be less injurious, and infinitely cheaper, than any compound which is imported from abroad. While the apple, and possibly other fruits, with increased skill in the making would offer agreeable variety. All such products should

be perfectly dry, that is, containing no free saccharine. Solutions of pure spirit and water may perhaps be permitted by exception for a very few of those who really require such stimulus.

But it is in the matter of food that there can be no compromise if it is intended to arrest the progress of calculous formation when it has once commenced. I have but one preliminary observation to make, always essential to be considered before defining strictly a dietary for any person. It is this: that when proposing to lay down a plan of this kind, whatever the object in view, the prescriber must ascertain the patient's habits, and especially what amount of bodily activity is habitually enjoyed, or demanded by the daily occupations of his life. It should be unnecessary to tell you, that where severe or prolonged muscular exertion must be sustained, in laborious occupation or in the pursuit of sport, more hydro-carbons and a little more nitrogenous food are desirable than for the sedentary man whose time is chiefly spent at the desk, in the office, in the courts, in the studio, in the carriage, and who has, moreover, but little opportunity for exercise. Make yourself acquainted with all his habitual modes of expenditure in the matter of physical energy, before furnishing detailed instructions as to the food which is to support it.

And not less is the age of the patient a matter of considerable importance. Let me insist on the truth of a doctrine which ought to be more familiarly known and acted upon than it is, viz. that all who have reached an age at which capacity for active exertion is diminished, should maintain a similar abstinence from such food, in order to ensure a continuance of health and comfort. There is no more common, and perhaps no more flagrant popular error than that which is responsible for the practice of constantly 'supporting,' as it is termed, those who manifest the debility of age by augmenting their supply of food. It should be remembered, that all excess of nutriment taken over the power of the patient to assimilate, and also to employ in healthy activity, must inevitably overtax the excretory powers, and become a source at least of discomfort if not of disease. In short, when sedentary or generally inactive habits are induced, whatever the cause, whether through debility, accident, or age, highly nutritious diet, and especially a large proportion of hydro-carbons, is

almost invariably prejudicial. This being premised as a general principle, I shall add that, for the calculous patient in particular, it is essential to enforce a very sparing use of fatty matters in food. If he is already stout, weighing some ten to twenty-five pounds, as often happens, more than the average attained by healthy men of active habits, the abstinence should be strict; and the gradual reduction of his weight ensured thereby will, within certain wide limits, denote the measure of his improvement in relation to his calculous tendency. In order to ensure a steady but gradual diminution of bulk, the patient should always be weighed by his adviser, and the amount registered for comparison week by week, that the effects of the change in diet may be accurately observed. A loss of four or five pounds during the first month will almost invariably be attended by a sense of increased power, of agreeable disposition to activity, in the place of pre-existing torpor, lassitude, and oppression. During the second month the diminution will be less; in the third less still, by the end of which time another three or four pounds or so will be taken from the heavy burdens which have afflicted the corpulent patient. When this condition is not present, a less rigid regulation in relation to fatty matters is necessary; although in all such cases they must be permitted in very moderate quantity.

What are the ordinary foods in daily use which largely contain the objectionable elements, and must therefore be more or less avoided? Milk, cream, butter, cheese, eggs (especially in the form of omelette), creams and pastry; fat pork in its many forms; suet in puddings and pastes, the fat of roast and boiled meats, &c. The homely rice or sago pudding, chiefly compounded of milk and egg with sugar, so excellent for our children, and for healthy active people—type of simplicity; I might almost say, of the domestic virtues—is in the last degree objectionable for your uric-acid-making, gouty patient. Nevertheless, all the farinaceæ may be used so as to furnish desirable dishes in the nature of puddings, if made savoury, not sweet, with light broths instead of milk, using eggs in moderation, some condiment (a pinch of curry, or a few morsels of chutney) instead of sugar. Then next all articles of food, whether natural products or artificially com-

bined, which contain sugar, particularly cane-sugar, must be expunged absolutely from the list of aliments permitted. I do not enlarge further here on the principle on which this advice is given. There is much to be said thereon, but this is neither the time nor the place for discussing the subject at great length. Suffice it to add that abstinence from the substances named probably lightens considerably the work of the liver, and so lessens manifold vicarious forms of activity on the part of the kidneys in accordance with the views already propounded. Let me just advert, however, to the dietetic system in force at Carlsbad in relation to the patients in question. Apparently in recognition of the principle explained above, the use of sugar and of butter is absolutely forbidden during a Carlsbad course; and were one of you a patient there, your purveyor would not supply you with the forbidden food, however much you might demand it. I can only say, as the result of observation, that this system, far more than that of eliminating meat from the dietary, will reduce the uric-acid deposit. By forbidding everything that contains sugar, and diminishing considerably all fatty matter—permitting nitrogenous food in fact, although only in moderate quantity, and diminishing greatly hydrocarbons—you will generally accomplish more than by the contrary method.

What then is the dietary to consist of? Fish in all its forms, except those which contain much fatty matter, as herrings, mackerel, eels, and the under part of the salmon. Game in all its forms and poultry; lean meat in moderate quantity, besides preparations of gelatine, often welcome and useful as savoury jelly as well as that which is otherwise agreeably flavoured or acidulated, but unsweetened. Butter in moderation is the only direct form of fat, some being necessary, which I am in the habit of permitting, as well as an egg or two (without which cookery is impossible, objection relating solely to the yolk or fatty part), and milk in strict moderation. Well-made bread, especially that which contains every portion of the wheat grain, outer envelope or husk included; oatmeal, pearl barley, macaroni, and the Italian pastes; all can be easily presented in numerous simple yet palatable modes, by the exercise of very little culinary intelligence, and ought to occupy a large place in the daily service of food.

In relation to whole-meal bread for daily regular use, let me pause an instant to remark that the value of inert matter as an essential part of our food seems to be quite lost sight of in the search for 'nutritious and supporting' elements, unmixed if possible with any other. Even so-called 'bread reformers' vaunt as an improvement their elaborate processes of ridding wheatmeal of every particle of what they are pleased to regard as useless matter. Few people appear to know that most of the habitual constipation, so generally complained of, is due solely to the fact that modern civilisation demands the elimination of everything that is not nutritious from our food, the consequence being that there is very little inert substance left after digestion to produce a fecal mass for the muscular intestine to grasp and transmit. The cereals and green vegetables, when employed in their nearly natural conditions, furnish for this very useful purpose a quantity of inert material, which a well-meant but blundering interference officiously removes. It is quite remarkable to what a large extent this important element of food is ignored, even by professed authorities on diet, unless its value be not, which is more probably true, wholly unknown and unsuspected by them. I may add that the whole-meal bread, which is on this account so valuable, may be improved, both in flavour and texture, by an admixture of fine, not coarse, Scotch oatmeal, in the proportion of one-fourth or one-third to the wheat-meal employed.

Another class of vegetable products of great importance on the ground of the nutritious elements, especially nitrogenous, which they contain, is presented by dried haricots in all their varieties and lentils. These are capable of furnishing excellent dishes, often preferred to joints of beef and mutton, which they may sometimes advantageously replace. They may also enter into the composition of soups in the form of purée, valuable for the ease with which they are usually digested and the amount of nutriment contained, especially to those whose occupation is active and demands physical exertion.

The less nutritious class, the farinaceæ, as rice, sago, tapioca, arrowroot, &c., are all useful treated in the manner above incidentally referred to, that is, as savoury dishes and not as sweets. Fresh green vegetables are especially to be re-

commended, and are worth bestowing some pains on, to obtain good and cook well, when they may form an important item of the list. The fresh legumes, such as green peas, young broad beans, &c., are valuable for most people, although a few do not digest them easily, especially if time is not given to mastication and insalivation (absolutely essential, not only for digestion, but to secure all their nutritious elements), however tender the vegetable product may be. Some persons can digest a light salad; others can eat no vegetable until it has been cooked; and no rule can be made applicable in all cases respecting it. Celery and seakale, asparagus and tomatoes, the potato and the artichoke, are important items on our list to which I know of no objection, although the potato has been often, as I think unnecessarily, excluded from it. Apples may generally be permitted, best when roasted or baked, without added sugar; but rhubarb, strawberries, raspberries, gooseberries and currants, grapes, plums, pears, and all sweet fruit, native or foreign, must be rejected without hesitation, whether fresh or preserved. For those persons who feel the loss of sugar in diet, as that of a luxury highly prized, and there are many who do so, no objection can be made to the use of the recently discovered product 'saccharin.' It exerts no action in the body akin to that of cane and grape sugars, and appears to be quite harmless in every respect.

Milk, already referred to, is very undesirable as an article of diet, both on account of the large proportion of fat and sugar it contains; while its nitrogenous principle, casein, is by no means a universally digestible element. At the same time a small quantity, to be taken with tea, coffee, or cocoa, not in the proportion usually adopted for 'café au lait,' may be taken without hesitation of course. In large quantity it is not only noxious, but is often digested with great difficulty by the class of patients now under consideration. Thoroughly skimmed it is less objectionable, although the remaining elements render caution in the matter of quantity still desirable. In the same way, there is no objection to the use of the white of egg, so valuable in cookery: the yolk being, from the large proportion of its oily constituent, the part which should be eliminated or employed with great moderation.

Here, I think, is a range for choice by no means to be

complained of, at all events for a class of patients whose dietary must, in some important particulars, be strictly curtailed. Modifications can and should be made by minimising or augmenting the relative proportion of animal and vegetable elements according to the engagements, surroundings, or idiosyncrasies of the individual.

I next remind you, after this brief but still sufficient sketch of the principles of the dietary, that other points of hygiene must be attended to, when conformity to the first and chief has been ensured. Thus it is essential to stipulate for a certain amount of muscular exercise, some to be taken in the fresh air daily. Quite as important is attention to the healthy action of the skin, encouraging this by a habit of simple daily bathing in the bedroom, following it by friction of the surface of the body in some efficient manner.

But the first-named object as well as the second may to some extent be accomplished by the same process, and by no better mode than by the systematic use of the flesh brush. I have long recommended for this purpose a brush specially made with rather soft bristles of unequal lengths, so as not to present an even flatly-cut surface, which latter effects the object imperfectly. The soft uneven bristles gently penetrate between folds and flexures, or follow the varied contours of the body, without irritating, much less abrading the skin. A pair of these, each with its strap passing over either hand of the user, systematically applied for five or ten minutes every morning, afford a capital form of exercise for those who have little opportunity of obtaining it sufficiently out of doors, and so for the middle-aged and elderly man offer an equivalent to the club or dumb-bell performance of the young and hearty.

At this period of life the capillary circulation of the skin mostly becomes languid and deficient, if not stimulated or provided for by some special means. Hence it is that unnatural dryness of the skin, harshness, chronic eruption, coldness or partial insensibility of the surface are so often experienced by elderly people. By daily gentle applications of the soft brush, circulation of the blood in the superficial capillaries is produced, and a skin which has long been dry, rough, and inactive may in a few weeks be rendered soft, supple, and vascular, like that of a healthy person in middle life. Better still, such a skin

performs its functions and takes its share of work among the other eliminating organs of the body.

It should not be forgotten that with the diet described, some increase of clothing is usually necessary. There is no doubt that thicker coverings in spring and winter are felt to be necessary now, than when food more rich in fat was freely consumed. On the other hand it is a marked and agreeable experience for many, that the oppressive heat and the plague of thirst which so many complain of in hot summer weather are unknown to the consumer of diet which is chiefly cereal and vegetable, with some fish and a little fruit, where no objection to its use exists. These matters are here named, being of essential importance, from their necessary and close relation to the subject of food and its functions.

Such then is an outline of the system, embracing a regulated diet, regimen, and the use of natural mineral waters, which I have so long and so satisfactorily employed, and which I strongly advise you to pursue for the purpose of checking calculous disease in its early stages, and so preventing the formation of stone in the bladder in that considerable majority of cases which are occasioned by an undue formation of uric acid. I shall only add that I invariably advise it in a more or less modified form, but the dietary invariably, for all patients on whom I have once operated for an acid calculus, in the hope of preventing the recurrence of any further product in the future. Nothing is more probable in a robust man of middle age who has once furnished such a product than the appearance of others in course of time. And you may wisely tell him this; but you may confidently add, that if he will follow your directions, implicitly and not half-heartedly, you can very nearly promise him a future immunity from stone as the consequence.

LECTURE XXVI.

ON THE TREATMENT OF STONE IN THE BLADDER BY SOLVENTS
ITS HISTORY AND PRACTICE.

GENTLEMEN,—The inquiry as to whether it be possible by the use of medicinal or chemical agents to dissolve stone in the bladder, and so to avoid any operative proceeding for its removal, is one which has excited a great amount of interest at different epochs of our history. During many centuries this question has appeared and reappeared. Some accident calls public attention to it; interest is aroused, experimental trials of some new agent, which probably proves to be an old one in modern guise, are made, achieving little or no success; after which a cycle of indifference follows. Meantime, as the sum of these reiterated efforts, some sort of progress results. Nevertheless the subject is scarcely considered in standard surgical works, although it is one fraught with interest to us all. For myself, I confess, it has always had a degree of fascination. It would be so great a triumph to our art to dissolve the stone without damage to the delicate structures in which it arises and finds its residence. And thus it is that I have not only alluded to it in various works, but have discussed it at considerable length many years ago in one of them.

I propose therefore to tell you what has been done, and what at present—indeed, how little—appears to be attainable by the agents employed; endeavouring to sketch the history of solvents for stone in the bladder from the earliest period to the present day.

You know that the existence of calculus was recognised, and that a cutting operation for its removal, at all events in the cases of boys, was practised, a few centuries before the Christian era. In course of time the attempt was made to dissolve it, especially in the case of adults. It appears that

neither Hippocrates nor Galen entertained the belief that this was possible. One of the earliest allusions to the practice is found in Pliny, who says that 'the ashes of burned snails' shells are good for expelling the stone.' Aretæus, in the second century of our era, recommends 'quicklime in honeyed water' for the same purpose. Later authors, quoted by Paulus Ægineta (seventh century), speak confidently of the efficacy of goat's blood, and they observe that certain solvent remedies if administered to inappropriate cases may increase the size of the calculus.

Arriving at the period when medicine flourished in Arabia, we find numerous specifics and some extraordinary combinations of them systematically given. The celebrated Avicenna (about the tenth century) enumerates many substances supposed to be efficacious. He and others of his time employed occasionally an impure carbonate of potash; but as an example of the kind of prescription current at this period, I give you one of them in full, translated from Avicenna, as it is a curiosity, and gives you a good idea of the very complicated mixture which sometimes constituted an ancient medicine: 'Take equal parts of calcined glass, of the ashes of scorpions, of the ashes of the root of colewort, of the ashes of a hare, of the ashes of egg-shells from which the chickens have escaped, of the stones found in the sponge, of goat's blood dried and powdered, of lapis judaicus, the same of parsley, wild carrots, marshmallow seeds, and gum arabic. Make it into an electuary with honey.'¹

Between this period and the fifteenth century we can mark no advance. About this time Basilius recommended the internal use of an alkaline salt, obtained from the cuttings of the vine in spring; this rests on the authority of Boerhaave.² Crollius, in his '*Basilica Chymica*' (Frankfort, 1608), recommended the patient to take a salt of tartar (carbonate of potash) in an infusion of parsley, and also some solutions of which lime was the principal ingredient. In 1650 Daniel Sennertus directs the internal use of the same remedies, and also that they should be injected into the bladder through a catheter. About the same time, Riverius, physician to the

¹ Avicenna, lib. iii. fen xviii. trac. i. c. xix.

² *Elem. Chimice*, 1732, ii. 73.

French Court, advises, as many others also did, the ashes of calcined egg-shells. The dose was a drachm of the powder, which was, of course, chiefly lime, to be given in white wine or with diluents twice a day; and it is stated that 'potenter expellit calculum in urinæ meatibus hærentem.'¹ Numerous other authorities might be quoted as repeating all these receipts with little or no variation.

Next in order comes, in this country, the famous Mrs. Joanna Stephens. This lady had acquired so great a reputation in the earlier part of the last century, that in 1739 the English Parliament, after a formal inquiry, purchased her secret for dissolving the stone at the cost of 5,000*l.*—a circumstance which produced a large and remarkable literature during the next few years, and gave a great stimulus to research. The document which was obtained at this cost commences thus:—

'My medicines are a powder, a decoction, and pills. The powder consists of egg-shells and snails, both calcined. The decoction is made by boiling some herbs (together with a ball which consists of soap, swine's cresses burnt to blackness, and honey) in water. The pills consist of snails calcined, wild carrot seeds, burdock seeds, ashen keys, hips and hawes, all burnt to blackness, soap, and honey.'²

The quantity given was a drachm of the powder three times a day, mixed in cider or other liquor, and followed by half a pint of the decoction. If the decoction disagreed with the stomach, the pills were to be substituted. These compounds were found to be very nauseous, and were soon superseded by other agents.

After this, Dr. Whytt, Professor of Medicine in the University of Edinburgh (1761), brought soap and lime-water into favour, giving one ounce of 'Alicant soap' and three pints of lime-water daily, and illustrating its use by a remarkable case or two.

In the practice of Blackrie (1766), Chittick (who made all his patients send locked cans of veal broth daily to his house that he might add the solvent and preserve his secret), and others, mixed solutions of potash and lime were much em-

¹ Riverius, *Praxis Medica*, Lugd. 1657, p. 381.

² *Gentleman's Magazine*, June 1739, ix. 298.

ployed ; and a considerable amount of evidence of their utility to allay pain was published on good authority. Soap leys of different strengths furnished the potash in many cases ; in others the 'salt' of tartar was given, and always in a very diluted form.

In France at an early date alkaline remedies had many advocates, such as Darcet (1726)¹ and Pierre Desault (1736). Morand, the famous surgeon of Paris, who came to London to report to the French Academy on Cheselden's operation of lithotomy, made also very careful observations on forty patients treated by Mrs. Stephens's remedies. He was unable to certify to a single case of removal by the solvent, but said that four 'thought themselves cured.' Much later, the subject of alkaline solvents was investigated by Fourcroy and Vauquelin ; more recently by C. Petit (1834). The first and last-named employed the Vichy waters. In Italy, Girardi (1764) recommended the use of solvents, but extolled especially the virtues of a decoction of uva ursi for that purpose.

Meantime the vegetable kingdom had been largely explored for the same purpose. It will suffice to give a list of a few of the principal plants so employed during the last two or three centuries. I shall name those only which enjoyed the greatest favour. The 'Banke cress,' or 'saxifrage' (the name being due to its reputed virtue) : its seeds boiled in decoction of couch grass ; dose of the seeds, one drachm. Tincture of the 'Pimpinella saxifraga.' A tincture of the seeds of the 'Lithospermum majus,' or 'great gromell.' The decoction of 'Broome ;' a tincture of the seeds of 'Fraxinella.' Tincture of the root of the 'Raphanus sativus,' or garden radish. Tincture of the seeds of the common nettle. The marsh and yellow mallows, the couch grass, parsley, and the wild carrot were also ingredients in the compound decoctions employed.

And now I come to the experience of to-day. And I suppose you to inquire, What are the existing resources available for a patient who desires at the present time to attempt the solution of a stone in his bladder ?

I shall divide these into two classes. First, there are the empirical remedies, which have a certain reputation ; and

¹ *Annales de Chimie*. Paris.

secondly, there is the result of the latest investigation of the subject by scientific observers.

First, the empirical remedies. It is a curious fact that in almost every European country there exist certain persons who obtain a livelihood by making and selling remedies to dissolve the stone. The recipes employed are usually family heirlooms, and a sort of reputation clings to the family, each generation of which carefully preserves the secret, such as it is, and the traditions of their predecessors. In the same way what is called the art of bone-setting, as you no doubt know, is associated with certain names and localities; known chiefly in provincial districts, where also flourish the makers of the nostrums now in question. The liquid solvents—for they usually take that form—are sold in this country under the name of ‘constitution water,’ or some similar term; and as a matter of course they are also guaranteed to be useful in all forms of urinary disease.

Peculiar circumstances have given me large opportunities of observing and examining these agents. I have met with them here and in different parts of France. I well remember an old Frenchwoman and her son journeying on foot from the South of France to Brussels, many years ago, laden with a basket of heavy bottles filled with the family nostrum for presentation to a royal patient there.¹ I may add that her devotion was substantially rewarded. Such unsolicited contributions—either material, as in this case, or by way of suggestion of every conceivable kind—flowed in then from every part of Europe; and such is always the case in similar circumstances.

Let me say that it has been my lot to receive numerous communications on this subject from known and unknown correspondents, urging on me the value of the recipes which belong to the writers. I shall select two examples, which widely differ, for mention here, each possessing interest of its own kind. One was from a French gentleman, who gives me his name, and offers an infallible cure for the stone, which of course he does not describe, but consents to communicate it for the moderate sum of a million of francs (40,000*l.* sterling);

¹ The first King Leopold of Belgium, who suffered severely from calculus, and whose case excited much interest at the time.

and I do not hesitate to say it would be well worth the cost if it could accomplish the wonderful results alleged to be within its power. The other communication was sent me by an English labourer in Bedfordshire, who wishes me to know what cured his friend some time ago in the neighbouring parish. He freely presents me with the formula, and it is a fair specimen of a good country recipe for the purpose—for I have seen many such—and it has some interest for us, as we shall find hereafter. I could not help writing my thanks to this man in reply, and was at some trouble to explain why his remedy might be good in some cases, and why it might be prejudicial in others. Here it is in his own words: ‘Get a peck of wood-ashes, and pour on them a gallon of boiling water; let it stand twenty-four hours: then strain it off as clear as possible, and take a wineglassful every morning, fasting.’ This is a large dose of carbonate of potash: our old friend, the alkali, you see, always recurring. I had the curiosity to determine the quantity. A ley of wood-ashes thus made from pine-wood furnishes a solution of fifty grains of the carbonate to the ounce, so that the quantity taken at once was at least a drachm and a half or two drachms. The other soluble constituents of the ley are sulphate and silicate of potash and chloride of potassium.

Now, as to the more pretentious compounds which are sold in this country as solvents, I have submitted the chief to careful chemical analysis, and I intend to present you with the result. Not that I had any doubt as to what their general characters and composition were, nor of the fact that they were all nearly alike in their composition. But I wish you to have an exact statement founded on analysis. A recent examination of a well-known and typical one sold as ‘constitution water,’ and in some repute in this country, shows it to consist of a simple undisguised solution of bicarbonate of potash in water. Two bottles are placed before you, and are at your service for analysis if you like to make it. You see that they are ordinary wine-bottles, the old ‘wine-quart;’ each contains about an ounce of bicarbonate of potash and fifteen grains of chloride of sodium—with a few sulphates in minute quantity, possibly due to the spring water of which evidently the solution is made. Half the bottle, which is

equivalent to four drachms of the potash salt, is directed to be taken daily. The price at which this 'constitution water' is sold is three shillings and sixpence the bottle!

And here let us make a rapid survey of the long and curious history of man's painful, slow, and somewhat clumsy efforts to rid himself by medicine of his terrible enemy the stone. Observe that the agents have always been alkaline. At first, and chiefly, the alkaline earth, lime: you mark it as the agent in the calcined snail-shells of Pliny and the egg-shells of Avicenna, which do but reappear in that expensive prescription of Mrs. Stephens in 1739; but in Avicenna's time it was combined with potash, the representative alkali of the vegetable kingdom, as you see in the quantity of burned plants which enter into the composition; and Mrs. Stephens, probably without knowing it, employed potash and soda also, by means of the very important addition of soap, calcined weeds and seeds to the egg-shells. After this lime-water and soap came into fashion, giving another combination of the three alkaline agents named. And the popular remedy of to-day before you, sold at so high a price to the purchaser, and of which a large quantity is ordered to be taken daily for three months, as the minimum dose and time, is, as you have just seen, a simple solution of bicarbonate of potash in water; and the cost of it to the seller is actually less than that of the bottle and the cork which enclose it! Our country labourer's nostrum is nearly if not quite as good in form, has precisely the same solvent power, and is almost absolutely without cost.

Then the alkali again appears in a group of natural mineral springs, of which a somewhat popular remedy—namely, Vichy water—is the type. These have been and still are largely employed by patients with urinary maladies, and have been vaunted for their solvent powers on the ground that they consist mainly of a strong solution of carbonate of soda, the alkali of the mineral kingdom, as potash is of the vegetable.

We are now in a position to arrive at the following conclusion, the only one possible—viz., that all the empirical and would-be secret medicines employed from time immemorial to the present day are solutions of either lime, soda, or potash,

alone or combined. All the plants, after combustion, furnish alike only one and the same active agent—viz., potash; all shells, whether of eggs or of marine and land animals, furnish alike only one and the same active agent—viz., lime.

Lastly, the medicinal remedies employed by the faculty everywhere, at the present day, are hydrate of potash in the form of liquor potassæ, the bicarbonate, the citrate, the acetate, and the tartrate of potash. After them, and less generally employed, are soda and lithia in different forms.

Now, before entering on any consideration of the applicability of all these agents as solvents, from a scientific and not from an empirical point of view, it is necessary to examine briefly the substances they are destined to act upon—namely, the stones in the kidney or the bladder which it is desired to dissolve. And the first fact that must strike you at the outset is, that these calculi are of different kinds; some having characters diametrically opposite to those of another kind. And the question naturally arises, Is it possible that one form of remedy—namely, the alkaline agent—can be adapted to dissolve calculi whose composition is so varied?

I shall remind you of those general terms which I used in a recent lecture on that subject to classify the varieties of urinary calculi. Three-fifths of all the calculi met with among adults of all ages are composed of uric acid and the urates; nearly two-fifths are chiefly phosphatic, many of which are 'mixed'—that is, contain at least two different constituents; and about 3 or 4 per cent. are oxalate of lime. Cystine is too rare to be admitted to our reckoning. Three-fifths at least, then, are the products of a urine abounding in acid, of which excess they are the expression. The remaining two-fifths are the product of urine generally alkaline, mostly ammoniacal, of which condition they are the result. The urates, the oxalates, and a very few of the phosphates, are formed in the kidney, and are the product of certain constitutional derangements; the greater part of the phosphatic material, whether in mixed or in phosphatic stones, is produced solely in the bladder, and is the product, not of a constitutional state, but of local disease there. Now, uric acid we know, by experiments conducted out of the body, to be soluble in alkaline solutions, but some of these have a more energetic solvent

action than others; and the resulting salts vary in solubility. Thus, urate of lime is a rather soluble salt. Urate of soda is less so, and in this form enters into the composition of some calculi. Urate of potash is more soluble than either of them. Potash, the alkali of the vegetable kingdom, appears to be the most powerful solvent (although lithia may be nearly equal) that can be employed on a uric-acid calculus, among those materials which are capable of being taken internally for a long period of time with comparative impunity. These facts, then, indicate it as the most desirable agent to employ under certain conditions, hereafter to be described, and as such it has long been regarded. More than thirty years ago I called attention to its pre-eminence for this purpose, stating that the 'citrates and carbonates of potash are more potent and certain than Vichy water' for the treatment of 'uric acid in the form of gravel,' and that they should be given largely diluted, pure water itself being one of the best solvents.¹ I may add, that I have always declined to prescribe Vichy water for any urinary affection, and on the ground of its inferiority to the potash solutions. I think the citrate of potash may be fairly said to be the salt which of all others offers the best chance of success: and this is now the opinion of all who have examined the subject. If, however, it exerts too much diuretic action, as in some cases it seems to do, the next best may be employed—namely, the bicarbonate, or the liquor potassæ.

A question of great interest comes before us here. Has citrate of potash been fairly tried on stone in the bladder by a competent observer? I am happy in being able to answer this question in the affirmative. A well-known and accomplished physician, Sir William Roberts, of Manchester, formerly a distinguished pupil of this school, has made carefully conducted experiments on calculi in and out of the bladder with certain results. I give you the following brief analysis of them.

Sir William Roberts finds carbonate of potash to be the most powerful solvent: better than soda, much better than lithia. The solution must not be too strong, otherwise an alkaline biurate coats the calculus and solution is checked. The best salts to administer by mouth are the citrate and the

¹ *The Lancet*, 1854, i. 439.

acetate, these, as you know, becoming carbonates in the urine. The adult dose should be forty or fifty grains in three or four ounces of water every three hours—equalling six drachms daily. The urine thus rendered alkaline may become cloudy from amorphous phosphates, but this state does not hinder solution, provided the urine is not also ammoniacal; but if it becomes so, it is most important to bear in mind that all solvent action then absolutely ceases. Hence it is useless to attempt the solution of a uric-acid stone unless the urine is naturally acid. If the urine is alkaline before commencement it is certainly ammoniacal, and no solvent will act, as mixed phosphates are deposited on the surface of the stone. He admits that it is quite useless to attempt the solution of a large calculus of any kind, or of an oxalate-of-lime calculus; and that nothing can be done with a phosphatic calculus except by the process of injecting into the bladder. Lastly, he states, alkaline injections of the bladder for uric-acid calculus are without efficacy. To resume: the following conditions are essential to success: certainty that the stone is of uric acid, and that it is of small size; that the urine is acid, and never ammoniacal. These extremely favourable conditions existing, the most powerful solvent known—potash—offers a fair chance of diminishing its volume considerably after a trial of several weeks, so that the nucleus may perhaps be passed by the urethra; but at present Sir William Roberts is not able to report so complete a success.¹

There, that is the best thing that modern science has yet done towards accomplishing the dissolution of the stone. Then you say, Have there been no results whatever from the empirical methods you have described? Have miserable calculous patients for two thousand years been swallowing to no purpose all the nauseous mixtures described, from the time of Pliny to Joanna Stephens, and onwards through Chittick, with his locked cans, to the nostrum dealers of our own time? I wish to give you a fair and distinct answer to that question, and will do so as far as it is in my power.

I reply, first, that no trustworthy evidence has yet been produced, that the complete solution of a stone in the bladder has been effected by any alkaline agent whatever. I cannot

¹ *Practical Treatise on Urinary and Renal Diseases*, 4th ed., 1885.

find that any patient, certified to have stone after sounding by a competent surgeon, has, after a course of any solvent, been again sounded, or submitted to autopsy, and demonstrated to be free from stone. Less evidence than this is valueless. That the alkaline solutions often greatly palliate severe symptoms in some cases and enable some patients, but by no means all, to continue in comparative comfort for a considerable time without extraction by any method, I have long been perfectly satisfied. I have seen a remarkable example or two of their influence among those aged and very infirm persons whom it would be very dangerous to submit at any rate to lateral lithotomy, and whose calculi are not within the limits of lithotripsy. Such have sometimes been enabled to spend the remainder of their lives with little or no suffering, provided that they were also enabled to maintain a condition of repose and freedom from movement. More commonly, however, the freedom from pain which alkaline agents produce is temporary only; and in some cases the effect of them is to produce considerable aggravation of the symptoms. This was often observed during the 'soap and lime-water' period. But it is not the question now to estimate what degree of palliative influence is exerted by alkalies, but whether they can effect a complete solution of the stone. Morand's cases, already referred to, of which twenty-two were sounded before taking the medicine, did not supply a single proved example of success. Among the alleged triumphs of the lime and potash treatment, many patients were examined after death and found to have stones, often numerous and large, still in the bladder.¹ But what is more to the point is, that the four persons who were examined by the trustees appointed by the Government to determine the merits of Mrs. Stephens's remedies, and certified to be cured, died, each one of them with stone in the bladder, where it was found by post-mortem examination!²

The case of Horace Walpole in the last century is well known; it was written by himself for the Royal Society. He commenced—being nearly seventy years of age—to take from

¹ Dr. James Parsons reports twelve post-mortems of Mrs. Stephens's patients, who, dying, were found in that condition. *A Description, &c.* London, 1742.

² Alston's *Lectures on the Materia Medica*, i. 268. London, 1773. The names of these patients were Gardiner, Appleton, Norris, and Brighty.

half an ounce to an ounce of Alicant soap and three pints of lime-water daily for many months at a time, and with short intervals, up to the period of his death at seventy-eight. He experienced great relief after taking them for a year or so, and ultimately believed himself to be cured. At his death three smallish calculi were found in his bladder. The case naturally attracted much interest at the time, and is one of the most carefully observed on record.

But there is another curious fact in connection with this matter, namely, that the great majority of the patients who took these medicines then, and of those who take such now, are not the subjects of stone at all. They have painful symptoms which they are pleased to consider evidence of stone in the bladder, and they take large doses of alkali—notoriously one of the best remedies for painful micturition from any cause—and obtain relief. They then tell their neighbours, and often certify in print, that they ‘have been cured of that dangerous malady the stone.’ These are the great cures which the nostrum-mongers rely upon. For what happens to those few of their clients who really have stone? Two things may happen: first, the stone, if uric-acid, becomes coated, as Sir William Roberts describes, with the biurate, which either adheres or comes away in scales; or, secondly, the urine will become ammoniacal; and thus in either case no dissolution whatever can occur. During the time, however, large quantities of white sediment composed of the earthy phosphates or even of shell-like fragments of the biurate, to say nothing of the white granular deposit of the mixed phosphates, come away; all which the poor patient is led to believe to be the débris of his stone and the proof of the efficacy of the solvent process! This fact exists in the great majority of cases, and is always relied upon by the nostrum vendor as an infallible sign of the value of the agent! Meantime the stone is acquiring, not slowly, fresh layers of deposit, and is becoming almost certainly larger. Such must often be the inevitable result where the medicines are empirically given—that is, without reference to the nature of the stone and the condition of the urine, and where the procedure cannot be watched and regulated on the principles laid down above. But, say you, this is a mere *à priori* statement, and looks very plausible, no

doubt ; but how do you know that this happens ? I will give you two instances which will suffice, and can give more, if required. Several years ago a man came to me from Yorkshire, who, having had symptoms of stone for a considerable time, was advised to take some well-known solvent for his malady. Accordingly he did so, and you will agree with me probably that he took enough to ensure it a fair trial, for he swallowed twenty-five pounds' worth of that very constitution water a sample of which you see before you on the table. He was relieved, but his life was necessarily an active one, and he had not the means of repose and the luxurious surroundings which Horace Walpole had, and his stone symptoms ultimately got worse. At last he came to me, and I crushed for him a large mixed calculus, the greater portion of which was phosphatic. Had he come to me before, it would have been a smaller one. The case did well, and the man lives at this day to tell the tale, and, if necessary, he is ready to tell it again. Since that time I have seen more painful illustrations of the mischief done by this nostrum ; one case especially, within the last few months, in which death was due to a large phosphatic stone produced through the action of the alkali taken. It was formed upon a small uric-acid calculus, which could have been crushed with ease and safety in three minutes when I first detected it, and recommended that course. But the patient preferred the ' solvent,' and in about two years filled his bladder with a phosphatic mass which cost him his life.

Now, mind, I do not venture to say that a calculus has never been dissolved, or that it is impossible to dissolve a small uric-acid calculus, by alkaline agents taken internally. I will go further, and express my belief that, given abundance of time and careful supervision, it may perhaps be possible. Nay, I will do more : the first case of such a kind that comes into the hospital, the patient consenting, I shall be pleased to submit him for the sake of experiment to the process, and to give it a fair trial. But this I say with certainty, that there is no evidence whatever that one case in a thousand of those who have swallowed solvents for the stone has been cured of it, during all past experience down to this day. No man who deliberately takes solvents for even a small calculus the

characters of which have not been carefully determined, can reckon on any better chance than this—viz. that it is a thousand to one against their success, and that it is more than probable that his stone will grow bigger during the process. And if the stone be large, the solution is impossible.

What is the value of the treatment in question? It is impossible to say more than that it may be valuable, not for stone in the bladder, but for that earlier stage of the same malady—stone in the kidney. That is the period of its history in which to attack the stone by solvents. When small uric-acid calculi are passing periodically or occasionally, much may be done: first, and chiefly, by preventive treatment, on principles I have already explained to you in the preceding lectures devoted to that subject; and if that be insufficient alone, secondly, by combining perhaps therewith some alkaline treatment. Granted proper constitutional treatment of the complaint in the early stage, there ought rarely to be much trouble with stone in the bladder. I confidently anticipate a future in which any severe operation for stone will be rare. Uric-acid stones only, as you know, are amenable to the process by solution; but, happily, they form the very large majority of renal calculi.

I must say a few words about agents to be used locally in the bladder for the solution of phosphatic formations which are not dissolved, but rather increased, by the internal remedies already described. You know that there are many patients, chiefly those who are unable to empty the bladder except by catheter, who are very prone to form calculous matter of the mixed phosphates, and this sometimes at a rapid rate. For these persons various solutions injected into the bladder may be valuable. The patient may be taught to administer them himself; numbers have been taught in my wards. Once or twice a day, after withdrawing all the urine by catheter, he applies to the end of it a four-ounce bottle, with a stopcock, containing a solution of acetate of lead, about one-third or one-half a grain to the ounce of distilled water together with some acetic acid. He throws in half the contents, and allows it to issue, carrying out with it some small debris perhaps. He next injects the second half, and allows it to remain there. This does something to prevent the formation of phosphatic

calculus, or, at all events, of the aggregation of its elements in the bladder. I have no intention to describe now at length the methods of mechanically dissolving or washing out these matters, when the above simple means are unsuccessful. More complete details in reference to this subject will be found in their proper place.

I must not omit to name the agency of electricity, which has also been locally employed, both for uric-acid and for phosphatic stones. Prévost and Dumas (1823) attempted direct solution of a stone in the bladder by the galvanic current, a plan which was more fully developed here by Dr. Bence Jones (1852). The amount of instrumental manipulation, however, necessary to bring the wires into contact with the stone, and to maintain them there during the period necessary for its solution, is considerably greater than that required to crush the stone by the modern method of lithotrity, and must therefore be regarded at present as inapplicable.

And now comes the inevitable final conclusion—inevitable because true. It has been shown that there is no chance for the dissolution of any but a small stone, and this provided only that it exist in the most favourable circumstances; and lastly, that in order to accomplish the task a considerable period of time must be devoted to the process.

For such a stone, gentlemen, but one brief sitting by lithotrity is necessary. No operation in the whole range of surgery is more certainly safe, rapid, and successful; and no other proceeding ought to be resorted to or even considered. I repeat the statement, that such a case I have never lost in the whole course of my experience. Nevertheless, a patient sometimes desires to be heard in relation to the course proposed, although he may be absolutely ignorant of the matter. He claims the right to exercise a choice, although he may not always manifest his wisdom in doing so. In these circumstances it becomes our duty to help him to form a just estimate of the relative merits of both methods; what these are I have thus endeavoured impartially to set before you.

LECTURE XXVII.

ON CYSTITIS AND PROSTATITIS.

GENTLEMEN,—It is quite possible that you may see little or nothing, even during a considerable experience of general practice, of those diseases which have occupied our last few lectures. Some men never meet with a case of stone in the bladder during a lifetime; and of those who do, very few undertake themselves to treat it. But the very reverse of this is the case with the subject which comes before us to-day. Fraught with much less of what one calls ‘interest’ for an operator, its attractiveness to the student must be found in the fact that cystitis, or inflammation of the bladder, is the commonest affection of that organ, that it is certain to occur in his practice, and probably not infrequently. For whatever else you may have to treat in connection with the urinary organs, you are certain to have cystitis. If a man has stricture, or disease of the kidney, or disease of the prostate, he generally becomes the subject, sooner or later, of cystitis to some extent; symptoms which are harassing and painful and for which he seeks your aid.

Cystitis may be usefully regarded, for clinical purposes, as appearing in four different forms.

1. Severely acute cystitis, following operation or injury.
2. Ordinary acute and subacute cystitis, always with more or less febrile symptoms.
3. The chronic stage, often a process of slow subsidence of the subacute attack; and rightly designated as chronic cystitis.
4. The Chronic Cystitis with characteristic large mucopurulent effusion; often but not very appropriately spoken of as ‘Catarrh.’

1. Acute cystitis in its most severe form is always a

lesion of dangerous character. It may be caused by the sudden breaking up of a large and hard stone, whether by the lithotrite, or by spontaneous cleavage, as sometimes happens, into rough and hard fragments, which will often produce acute and dangerous cystitis unless speedily removed. Severe mechanical injury inflicted on the bladder in perineal lithotomy by rough and forcible dilatation of the neck in removing large calculus, by injudicious sounding, and forcible or irritant fluid injections, have been sometimes observed as causes. The outset of the attack is marked by a severe rigor, followed by extremely painful and frequent micturition, with urine bloody at first, then mixed with mucus, finally becoming a dense dark crimson slimy mass which adheres to the vessel. The patient's pulse and temperature are high; a dry tongue, thirst, and weakness rapidly increasing, indicate that, unless relief is soon afforded, a fatal issue will be reached in a few days. If this happens, and an autopsy is made, the mucous membrane of the bladder is seen to be of a dark crimson hue throughout, or nearly so, and there are often spots where it appears to be sloughing, so that the muscular fibres are exposed.

2. The less severe form, which may be called ordinary acute or subacute cystitis, is extremely common. It may affect the whole of the lining membrane of the organ, involving sometimes more or less the deeper structures. When less severe it may, perhaps, as has long been held by many, affect chiefly a region, not very accurately defined in extent, termed 'the neck of the bladder.' And it is far from improbable that in some of the slighter or more evanescent instances, the inflammatory action, which is nevertheless acute, involves mainly at first the mucous membrane of the prostatic urethra, together with that which is adjacent to the internal meatus within the cavity of the bladder. And as, anatomically speaking, it is scarcely possible to say precisely where the prostate ceases and the bladder begins, it may be legitimate to speak of an inflammation affecting this neighbourhood as 'inflammation of the neck of the bladder.'

The most obvious example of it is that which so often follows an attack of gonorrhœa, commencing generally about the third week, especially after exposure to cold and damp, or

in connection perhaps with intemperate drinking. The course is usually a brief one if the patient can take complete repose ; the local symptoms may nevertheless be urgent and painful, and there is usually some degree of general fever. But if the patient is unable to remain quiet, the attack is liable to be obstinate and chronic.

The causes which originate a less active or subacute form of cystitis, chiefly important as leading to the chronic form arising therefrom, are various. And many examples of the complaint continue to be chronic in spite of treatment, because the cause is an organic one, and therefore persisting in its nature. Some of these are obvious enough ; on the other hand, the cause is occasionally doubtful, and may completely baffle our diagnostic skill. The easily ascertainable persisting causes are stricture of the urethra, enlargement of the prostate and calculus ; or there may be some cancerous or other growth affecting the bladder ; more rarely still a tubercular condition in the organs may produce it. So also may the continued presence of pus in considerable quantity descending from the kidney, or from the pelvis and ureter. Atony of the bladder, produced by over-distension, and thinning of the coats, or by loss of nerve power through cerebral or spinal disease or injury, is a persisting cause of chronic inflammation. But of all varieties the most rare perhaps, and yet by no means to be forgotten in a doubtful case, is the presence of a fistulous opening between the bowel and the bladder, resulting usually from some organic disease of the former. Then, in the female, certain displacements of the uterus, as well as organic diseases of the organ, are met with as indirect causes of cystitis.

The improper use of instruments must be regarded, I fear, as a frequent cause of simple acute and subacute cystitis ; and it may operate in more than one way. A mild attack may arise during the employment of any instrument, whether rigid or pliable, from merely mechanical irritation. But I am not sure that a more frequent, although less obvious one, is infection thus communicated to the bladder and originating a septic condition of the urine and some inflammation of the mucous membrane.

All instruments which are made hollow, or with interstices, like catheters and lithotrites, are liable to convey with great

facility contagious matter, if there be any, in the form of a minute quantity of pus for example, which has lodged in a crevice and has since dried. This is dissolved by some moisture in the passages of another patient, and becomes retained there, and as a consequence often rapidly produces inflammation of varying intensity in the urethra and bladder. I am quite satisfied that this is not only sometimes the cause of these complaints, but that it is not an infrequent one. Once the fact is known to you, any repetition of such an unhappy occurrence in your hands will be a scandal, and you are bound to guard against it diligently. Every flexible catheter after being passed into the urethra should be plunged at once into a basin of warm carbolic acid and water, one part to forty or fifty, and having remained there a few minutes, should be cleansed by a jet of the solution driven by syringe or elastic bottle through the interior. Silver catheters and lithotrites should be dipped in a boiling solution of the acid and water, and be well rinsed in it. All oil or greasy material used for lubrication should contain at least a twentieth part of carbolic acid: the combination has no irritating quality.

I am afraid cystitis is also sometimes caused by the unnecessary use of instruments in the urethra and bladder. When gonorrhœa exists, or when there is an irritable condition of urethra following it, the early and most obvious signs of the original complaint having passed off, a patient sometimes presents himself to his surgeon stating that his stream is small and passed with difficulty, and suggests a 'stricture' as the cause. Although there is really no evidence whatever that this is the occasion of the symptom complained of, the suggestion is accepted, somewhat thoughtlessly perhaps, and especially if the instrument is not very flexible, or not very gently passed, a troublesome attack of inflammation may very readily be set up. I name this as a warning: I have too often met with such a history, and it is sometimes a very damaging incident for the patient, and it most assuredly is often an untoward one also for the practitioner.

Then certain forms of the complaint are attributed to gout or rheumatism. That these are factors capable of aggravating an existing inflammation I do not doubt. Whether they are capable of producing it by their sole influence, apart from

pre-existing local lesion, is less easy to decide. And here let me beg you to remember that cystitis has almost always some ascertainable local cause; it very rarely appears in what is called an idiopathic form, and if you come to the conclusion that it is so, you have probably not investigated the case sufficiently. Possibly you may in some such unusual case be induced to assent to the theory that it is due to a gouty diathesis. A very refuge in time of trouble for practitioners of feeble diagnostic power is gout, particularly 'suppressed gout;' therefore beware of it. On the other hand, you may not be wholly wrong in suspecting its presence. Perhaps it is true that inflammation of the urethra or bladder may be sometimes a merely local development of the ubiquitous influence so named; yet I am sure that this cause is of rare occurrence. Lastly, I must just remind you that certain irritant poisons—amongst which cantharides is the most prominent and likely to be met with—occasion cystitis, which I have seen severe in character, and lasting from ten to twenty hours, as the effect of an ordinary blister.¹

Treatment of the Severe form of Acute Cystitis.—As this is almost invariably the result of mechanical injury, the removal of the exciting cause, if still remaining, is the first and the essential step. A sharp or rough fragment of calculus left after lithotrity or otherwise must be broken up and taken away at once without waiting for the inflammation to subside. This assuredly will not take place until the foreign body, whatever it may be, has been removed, augmenting as it does every hour, by its presence, destructive ulceration of the membrane in contact with it, and also the sufferings of the patient. When caused by violence in perineal lithotomy, nothing is to be done but to provide a complete artificial channel to carry off the urine, usually by tube: in some exceptional cases, however, a suprapubic opening would afford a safer and better exit.

The symptoms of ordinary acute or subacute cystitis are :

¹ I think it may be useful to suggest that this possibly never occurs except where the blister is applied to a cutaneous surface which has previously been broken, or from which the epithelium has been previously removed. The only instance in which I have seen it—referred to in the text—was one in which the blister was applied over a knee-joint the cutaneous surface of which had been previously inflamed by iodine.

unduly frequent micturition ; urgency (by which I mean that the want must be complied with as soon as it is felt) ; pain at the end of passing water, or a sensation of uneasy desire to pass more although the bladder has been emptied ; a dull pain at the bottom of the belly above the pubes ; and occasionally a little oozing of blood is observed at the last act of straining. A febrile condition of system is generally present, often slight, while the urine is always cloudy and has a disagreeable odour.

The treatment consists, first, in maintaining the urine at a neutral or, better still, at a very slightly acid reaction, by just enough alkali, in small doses, frequently repeated, to produce that effect. To all other forms of the agent I prefer the liquor potassæ. Give it largely diluted in barley water, or decoction of *Triticum repens*. Hot hip-baths, ranging from 100° to 110°, for fifteen minutes, two or three times daily, afford great relief. Laxatives for the bowels, light food, together with local poultices and anodynes if necessary ; and rest in the recumbent position as far as possible. Besides these, the use of certain infusions and decoctions, uva ursi, buchu, pareira brava and others, of which I shall speak hereafter.

But that which most requires our attention is the chronic form of the disease. It is that which requires the most care and judgment, and for which we have most to do in the shape of treatment.

Chronic cystitis appears, as I have said, in two forms :—

In the simpler form, which is for the most part the stage of subsidence between the acute attack and convalescence, the chief sign in the urine itself is an admixture with it, more or less considerable in quantity, of the natural mucus of the bladder. When you have a ‘common cold in the head,’ there is inflammation of the mucous membrane lining the nose and frontal sinuses, with increase of its secretion in density and in quantity : in like manner the inflamed mucous membrane of the bladder producing largely a similar product renders the urine partially opaque, and somewhat dense. Moreover, as the lining membrane in this condition is very sensitive, its capacity for becoming extended by accumulating urine, is very small, as it is in the acute form also ; and therefore the bladder is forced to expel its contents as soon as possible ; hence frequent micturition is a conspicuous symptom. There are

painful micturition, with urgency, constant dull pain about the region, and a slight appearance of blood may be often met with at the end of the act. The treatment of the chronic form is a modification of that which has been necessary in the acute stage. But the pathological condition is essentially one in which local applications are valuable, and among them the injection of a weak solution of nitrate of silver is the best. The solution should not be stronger than half a grain in four ounces of warm water to begin with, and should be used at least once daily; avoiding all undue local irritation by using only soft and delicate instruments and always with the greatest gentleness. The manner of employing such an injection, whether to the bladder alone or to the prostatic urethra as well as to the bladder, I shall describe presently.

But I have referred to another form of chronic cystitis, in which the mucus has a distinct character. It is often spoken of as ‘catarrh of the bladder’—a term which I have already alluded to as an unfortunate one, since it has led to much error in practice. The appearance of the secretion is very peculiar, when observed by pouring out the contents of the vessel after it has been standing for some time. The mucus which partially subsides is exceedingly tenacious and adhesive, remaining behind while the supernatant urine flows off, and then follows in a mass. A pint or more of it may be deposited in the twenty-four hours by some patients for weeks or months unless checked by proper treatment. The urine also is offensive, ammoniacal, of course loaded with bacteria and containing prismatic triple phosphates in abundance. It is this condition to which the term ‘catarrh’ was originally applied, although, especially abroad, it is adopted to denote almost any mucopurulent deposit in the urine. Hence it has come to be regarded as a disease, and in the minds of patients associated with severity, or at all events with extreme obstinacy in relation to treatment. Hence to tell a patient that he has ‘catarrh of the bladder’ generally occasions him much anxiety. Now, this arises from the error of regarding it as a chronic disease in itself, instead of as a symptom of some lesion, for the most part easily curable. Catarrh of the bladder is no more to be regarded as a disease than, for example, is dropsy. Formerly, you know, dropsy was spoken of as a formidable

malady, and it still is so to the popular mind ; but no intelligent student would now think of it except as a symptom. He would say : ‘ What is the cause of it ? Is it due to cardiac, to renal, or to hepatic disease ? ’ Precisely so it is with ‘ catarrh of the bladder.’ You inquire what is the cause of it, and you will find in nine cases out of ten there is a very distinct cause, and mostly a removable one. The investigation of a case is not to be checked at the outset by accepting the term as a nosological one so that you have only next to demand, ‘ What is the best treatment of “ catarrh ” ? ’ but you must carry the diagnosis further, and ascertain the condition which has occasioned this marked symptom. And the most common cause is one but too often overlooked, as I shall repeat—viz. inability of the bladder, either from atony of its coats or prostatic obstruction, to get rid of all the urine it contains. This peculiar muco-purulent secretion, called ‘ catarrhal,’ is, however, by no means always present in these circumstances, and I cannot tell you here how it happens that in some cases of retained urine, otherwise apparently similar, only a light flocculent mucus is present, while in others there is a very large quantity of the characteristic tenacious matter.

With regard to treatment, the first thing is to take care that the bladder is emptied by a catheter once, twice, or three times a day, in the easiest manner possible, as treated of in Lectures X. (pp. 121–7) and XI. And this is necessary because decomposing urine is a source of great irritation to the mucous membrane. The urea contained in the secretion which enters by the ureters in a healthy state, meets in the bladder with urine containing putrefactive agents, and is soon decomposed into carbonate of ammonia, an irritating salt, which aggravates the already diseased condition of the mucous lining of the viscus. You explain to your patient that his bladder, not having been emptied for many months perhaps, has acquired a condition somewhat resembling that which a badly washed utensil would have attained in like circumstances—a useful and sufficiently accurate illustration for the lay understanding—and he will appreciate it readily when he finds, as he probably will, that the evil odour disappears and that the mucus diminishes considerably after adopting this treatment.

But suppose it does not do so, or does so but slightly, what

then? I will tell you what sometimes happens, and I am not sure that the fact I am about to ask your attention to has been previously observed or recorded. It is this: *we cannot in all cases completely empty the bladder with a catheter.* When the prostate is irregular in shape, and throws out protuberances into the vesical cavity, there are sinuses or spaces between them which retain one, two, or even more drachms of urine. Again, there are not unfrequently numerous small sacculi in the coats of the bladder which become charged with urine and act in the same way. When obstruction at the neck has existed some time, the daily straining—although not considerable—necessary to expel the urine, produces hypertrophy of the bands which form the muscular coat of the bladder. Thus these bands, which cross each other in every direction, become more prominent than natural, and the mucous lining of the bladder, weakened by expansion, is gradually forced, by long-continued expulsive efforts, between them, and pouches varying considerably in depth and size are formed. In these it is not very uncommon for calculi to secrete themselves, and thus in time an encysted calculus results. But what is more to our purpose, however, these pouches form receptacles for urine, which becomes stale and irritating in consequence; and not at all unfrequently they attain a large size: such an one is depicted at fig. 96. Now, the mere withdrawal of the urine by catheter by no means empties the reservoir in any of these conditions, and enough of noxious fluid is left in the sacculi to maintain an unhealthy condition of the lining membrane. In order to clear them of their contents it is essential to wash out the bladder at least two or three times a day with a little warm water containing a little boracic acid or a trace of carbolic acid before the catheter is removed. I am very particular indeed as to the manner of doing this. Washing out the bladder may be a very valuable mode of treatment, or a mere contrivance for seriously irritating that organ, according to the way in which it is performed. A common mode—indeed, that which was mostly employed some years ago—was to attach to the catheter (which was often of silver, and it is unnecessary to explain to you the superiority of flexible instruments) a large metal syringe, and to throw in with considerable force six or eight ounces of water. A still more pernicious

and useless contrivance was the double-current catheter, now never used by practical men. I wish you to cherish a wholesome horror of such proceedings which can in no case be necessary. A healthy bladder, and much more an inflamed

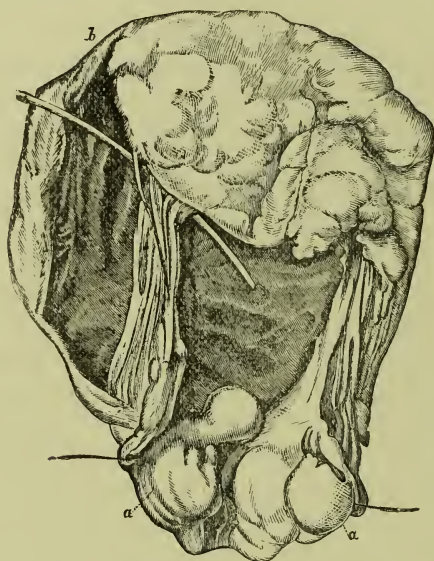


FIG. 96.—Section of bladder and prostate. A large sac of the former, marked *b*, produced by long-standing unrelieved retention of urine; a bougie lies in the small opening by which it communicated with the bladder. *a, a*, Enlarged prostate laid open.

and sensitive one, can only be disturbed and pained by the introduction of large and rigid instruments. This sensitive organ is only accustomed to be distended gradually by the continued percolation into it of urine from the kidneys. Let your washing-out conform at least in some respect to that process. Never, under these circumstances, throw in more than two ounces: and even this quantity, for efficient washing, is sometimes too large. Proceed then as follows: You have a flexible catheter in the bladder; have ready a four-ounce india-rubber bottle—with a brass nozzle and stopcock, the nozzle long and tapering, so as to fit a catheter of any size between Nos. 5 and 10—filled with warm water, say at 100° Fahr. Attach the nozzle gently to the catheter, and throw in slowly a fourth of the contents; let that run out—the fluid will be thick and dirty, no doubt; then inject another fourth, which will be less

so; again another, which will return clearer than the preceding; and the fourth portion will probably come away nearly clear. Now, these four separate washings of an ounce each will have been really more efficient than two washings of four ounces each; and you will, in obedience to my never-failing injunction, have reduced the amount of instrumental irritation to a minimum. Ten to one but the patient will find the performance soothing to his feelings. There are other methods of effecting the object, but this is the *principle* I want you to understand; and the mode of carrying it out which I have described is one of the simplest.

I referred to certain cases, gonorrhœal in their origin chiefly, in which the inflammation might be regarded as affecting the prostatic urethra, as well as the adjacent part of the bladder, and loosely spoken of as inflammation of the neck of the bladder. It is desirable to apply the solution to about three inches of the posterior part of the urethra, in this condition. This may be done by withdrawing the soft catheter, through which the injection is carried into the bladder, slowly outwards while injecting: so that the end of the catheter passes through the part named, and the current still issuing traverses the region after leaving the bladder. A more perfect way is to apply the solution by instillation, using

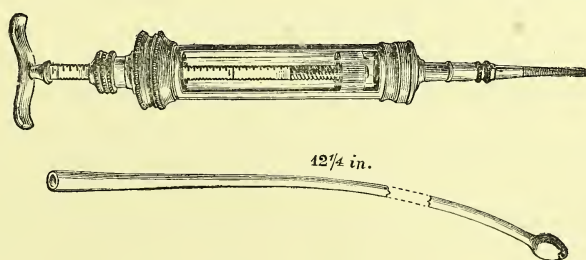


FIG. 97.—Instillation syringe; the piston moves by screw action. Gum elastic tubes with bulbous ends of different sizes are employed for different ages, and according to the purpose required.

a stronger solution and in smaller quantity. The little syringe contains from one to two drachms, and this may be used to introduce a solution of two to five grains to the ounce as a maximum. The same solution may be used in some forms of chronic prostatitis up to twenty grains to the ounce.

Another mode of introducing solutions into the bladder, viz. in the form of fine spray by forcing the fluid through a number of very minute openings, has been employed by some. It has no advantage over the methods described, is more irritating, and it is scarcely necessary to say, the spray is instantly condensed into drops on its appearance within the bladder, retaining the spray character only for a fraction of a second on entering. It is named here solely that you may be aware of the plan, if such it can be called.

What if washing-out has not accomplished all we wish? We may then, and often with great advantage, try medicated injections. Perhaps the best mild astringent, when the urine is alkaline and depositing phosphates, is the acetate of lead, in the proportion of one grain to four ounces of warm water, very rarely should it be stronger; to be used once a day. After this comes the dilute nitric acid; one or two minims to the ounce of water; or dilute phosphoric acid, three or four minims to the ounce; or acetic acid, eight or ten minims to the ounce, with acetate of lead, and, if you like, with a grain of acetate of morphia also. A solution of tannic acid, of one grain to the ounce, is a useful astringent in some cases of abundant mucous deposit. Then one of the most effective is certainly nitrate of silver in small quantity—certainly not more than half a grain to four ounces to begin with, increasing gradually, if necessary, to about half a grain at most to the ounce. For all chronic cystitis, and particularly that which sometimes follows lithotrity, this is by far the best. After this ranks a solution of acetate of lead in combination as follows: two scruples of the salt with six drachms of dilute acetic acid, half a drachm of carbolic acid, to four ounces of water. Use one drachm of this mixture in four ounces of water once or twice a day.

When the urine is very offensive, one or two drops of the medicinal carbolic acid to the ounce of water may be used, and this is quite strong enough. One drachm of a saturated solution of boric acid is believed by some to be less irritating than carbolic acid, but the latter is not at all so if a weak solution is used. Then there is a soothing injection well worth your remembering—viz. biborate of soda and glycerine. It may be used where there is no great occasion for an astringent, or it

may be combined with one. The value of this for sore mouth suggested to me its use for an irritable bladder, and experience has confirmed my expectation. Here is my formula:—Two ounces of glycerine will hold in solution one ounce of biborate of soda; to this add two ounces of water. Let this be the solution, of which you add half an ounce to four ounces of warm water. Another may be made of two or three drachms of boro-glyceride to four ounces of water. I arrange all these solutions for four ounces, because the four-ounce indiarubber injecting bottle already described is a convenient and portable instrument. Formerly great value was claimed for a solution of quinine as an injection, from one to two grains to the ounce of water, with a drop or two of acetic acid to ensure solution, in presence of mucous and offensive urine. I have tried it, and cannot say that it has yielded me any remarkable results.

In circumstances of great pain you may inject anodynes into the bladder if you please: but they are of little value. And you need not be afraid of the quantity; for the mucous membrane of the bladder appears to have little or no absorbing power, unlike the neighbouring tissue which lines the rectum.¹ The latter cavity, indeed, is your place for action, if spasm and pain greatly disturb the patient; a suppository of cocoa-nut butter, containing from a third of a grain up to a grain of morphia, being often of great service. A grain, or a little less, of the extract of belladonna is sometimes useful as a suppository for young and middle-aged adults, to allay frequent and painful micturition. But for most cases of enlarged prostate, associated, as it commonly is, with a

¹ Some one thought proper to question, in one of the journals, the accuracy of this statement relative to the effect of narcotic injections into the bladder, and even to caution my readers against relying on me too implicitly. It might have seemed otherwise almost unnecessary to say, that this particular statement presented the result of very numerous experiments and observations; and its object was of course to show that such injections afford little relief, and are, therefore, not to be relied upon for such service. My only reply to the critic was to inject *four drachms* of Liq. opii sed. into the bladder of a patient with chronic cystitis, in one of my wards in University College Hospital, on four separate occasions, in presence of the students, who verified for themselves the absence of any sign of the presence of opium in the system. Subsequently a dose (*by mouth*) of twenty minims for the same man, produced notable contraction of the pupil.

bladder of very little power, belladonna is prejudicial, paralysing the little remains of contractile function in that organ, and thus making the patient's condition worse than before.

Counter-irritants play a small part among our remedies; perhaps the best and safest is a hot linseed poultice, well sprinkled with strong flour of mustard, above the pubes. I cannot recommend croton oil, or nitrate of silver, as counter-irritants there. Hot fomentations, in the form of bran or sand-bags, hot flannels, &c., alleviate pain materially; so also do hot hip-baths and the hot bidet.

Then there is a host of infusions and decoctions reputed to exercise a beneficial influence in cystitis. I will name some of them in what I think to be about the order of their value for the cases one commonly meets with: Buchu, *Triticum repens*, *Alchemilla arvensis*, *Pareira brava*, and *Uva ursi*. Now, for the doses of these, your conventional tablespoonful is a miserably inefficient measure. Of the first, fourth, and fifth, give half a pint or more daily; of the second and third, a pint; that is, of their infusions or decoctions, as the case may be.

The underground stem of the *Triticum repens*, or common couch grass, was introduced some years ago by myself. Of this I will only say that it maintains its credit, and is undoubtedly very useful in many cases. For use, boil slowly from two to four ounces in a quart of water until reduced to a pint; the strained liquor to be taken by the patient in four doses in the twenty-four hours. It was a favourite remedy in the old herbals; and it formed the staple medicine against what was called 'strangury,' which, a few centuries ago, meant everything like pain or difficulty in making water, no matter what the cause; for the art of diagnosis was then in its earliest infancy. The 'Parsley pier' (derived from 'percer la pierre,' and not a parsley or umbelliferous plant at all), or *Alchemilla arvensis*, has proved in my experience an admirable remedy in obscure cases. Use it as an infusion: one ounce to the pint. Buchu, *pareira brava*, and *uva ursi* are, as you know, officinal in the British Pharmacopœia: the first seems to act by reason of the volatile oil it contains, which, by the way, makes it often disagree with a delicate stomach, in which case do not continue to administer it. In any case, buchu

should not be given for any long period of time. The other two agents may be taken for several weeks if necessary; but they cannot be regarded as very valuable remedies. Besides these there are the resins, which have a certain amount of influence upon the mucous membrane of the bladder; such, for instance, as copaiba, sandalwood oil, Venice turpentine, &c. You should not, however, give the dose which you would give in gonorrhœa. Five minims of copaiba, three or four times a day, in mucilage, is sometimes useful. I may say the same of the oil of cubebs.

One word about alkalies. As a rule, no doubt, alkalies, in neutralising acid urine, greatly help to control chronic cystitis; and I prefer the liquor potassæ to the bicarbonates, tartrates, and citrates, which appear to have more diuretic action, and to increase the quantity of urine, an action you would rather avoid, so as to lessen the frequency of micturition. The old combination of liquor potassæ and henbane, affirmed to be a union of incompatibles, nevertheless seems to me one of the most valuable forms in practice. It is affirmed on high authority that both hyoscyamus and belladonna are deprived of certain specific qualities when mixed with liquor potassæ. Chemical changes undoubtedly are thus produced. But I am perfectly satisfied that this combination materially controls painful and frequent micturition in the complaint we are considering. Hence I have continued to employ it, and for the reason stated.

Now as to acids. Remember that these are by no means the complement of alkalies in relation to their influence on urine. Beware of the current notion that it is possible to produce an acid reaction on urine by giving mineral acids by the mouth. By giving alkalies, you can make the urine neutral or alkaline to any extent you please, but you cannot do the converse with these acids. Yet I constantly hear it said, 'The patient's urine is very alkaline; had we not better order acids?' The reply might be, 'By all means; give an ounce daily, if you like, but it will not change the reaction of the urine.' In the course of numerous experiments which I made many years ago, I reached that dose, giving it, of course, greatly diluted, without the slightest effect on alkaline urine. No doubt mineral acids are sometimes useful 'tonics,' and

may do some good ; but don't prescribe them with the view of directly acting on the urine. The acids that do act on the urine are benzoic acid and citric acid, but you have to give so much of these that I do not know whether the remedy may not cause discomforts equal to those which arise from the disease. The benzoic acid has also some balsamic character, and is doubtless useful in some cases of chronic cystitis. The best way to give it is in pills, as it is not soluble in water. Three or four grains, with one drop of glycerine, is a good form ; and you must give as many as ten or twelve pills a day to attain any result. At all events, it is useless to give less than six ; which would amount to twenty-four grains in the day. Lemon juice has also an acid influence on the urine, and if it agrees with the stomach, may be taken in large quantity. But here is the important fact for you to remember : Surplus of acid in the urine is a constitutional error, and it enters the urinary passages at the kidney. It requires constitutional treatment, that is, of the digestive rather than of the excretory organs, and mere alkaline treatment does but neutralise and mask the acid—does not prevent its production. You have to remodel the patient's habits, control his diet, and take care that his liver and bowels act freely. On the other hand, persistent alkali in the urine is, in nineteen cases out of twenty, a *local* formation in the bladder. If you take pains to get a specimen of the urine direct from the kidney before its alteration in the bladder, you will mostly find it acid. Such alkaline urine requires local treatment, as by catheter and injecting-bottle, and not physic. Now and then you meet with neutral or alkaline urine, milky-looking from amorphous phosphates, as a constant morbid condition ; but this occurrence is rare in comparison with the cases I am now describing.

It is quite common for human urine to be loaded with bacteria, as it comes from the bladder ; and it has been supposed by some, that the presence of the bacteria is a common cause of cystitis, and that this will disappear if by disinfectant or germicide injections you get rid of them. Of course the mere action of the germicide will not suffice to put an end to the cystitis. In any case its employment must be continued for some time, and probably the nitrate of silver injection will

be required also. In all decomposing urine, bacteria, chiefly the 'bacterium ureæ,' are present, and it is through their agency that the urea is converted into ammonia. It is difficult to imagine sometimes how they have arrived at the interior: I have seen them in the freshly passed urine of an individual who has never had a catheter in his bladder; for it is natural to believe that catheterism is the means by which they are generally introduced into that cavity. Whether that be so or not, I think it wise to add a trace of carbolic acid to almost all the injections used for it, as a matter of precaution.

Before quitting the subject of cystitis, let me refer to the fact that sometimes, although very rarely, a case is met with, in which the symptoms are very severe, and in which no cause is discoverable, although careful research has been made. There is no stone; the bladder empties itself, or nearly so; it has been washed out, and the patient has taken all the remedies of high repute without benefit, and he not merely suffers great inconvenience, but also great pain and loss of rest. The condition threatens to shorten a life which has already become a burden.

In such circumstances the question of opening the urethra, and draining the bladder through the perineal opening for ten or fourteen days, is certainly to be thought of. You must be satisfied that the patient's kidneys are not the cause of his trouble, and that they do not, at any rate largely, participate therein; and that no cancerous growth is present; unless you desire to relieve pain in the last stage. We discussed this proceeding as well as that of employing a suprapubic opening for such exceptional cases in Lecture XII. (p. 145).

I shall close this lecture with some brief remarks on acute and chronic prostatitis.

Acute prostatitis occurs in different degrees of severity, and often comes first before the practitioner's notice when it causes retention of urine by obstructing the neck of the bladder. How this emergency is to be met I have described at some length in Lecture XIII. (p. 157). The organ is usually considerably swollen and very tender, and if the inflammation continues it may give rise to abscesses in the substance of the gland, or adjacent to it; and the matter may

burst either into the urethra, its most common course, or into the rectum. A soft catheter gently used is mostly necessary in such circumstances. The general treatment consists in confinement to bed, hot hip baths frequently repeated, hot fomentations, small doses of antimony if the attack is severe, and aperients, with mild forms of nourishment suitable to a patient who has some degree of fever.

Chronic inflammation of the urethra, passing through the prostate, and more or less affecting the prostate itself, is a condition less generally known or recognised. Nevertheless, it is a common and important affection. We see it frequently, but not invariably, as the result of obstinate gonorrhœa. I have already referred to it as the cause of symptoms resembling, more than any other malady, those of calculus in the bladder when mild in degree. Thus a patient of twenty or thirty years of age tells you that the following symptoms have rather gradually appeared: Undue frequency of micturition; pain following the act, and felt in the end of the penis; occasionally a little blood seen with the last few drops of urine, which may be somewhat cloudy with muco-purulent deposit; a sense of heat and weight in the perineum and rectum; there is, perhaps, also some gleet discharge in the urethra. All these conditions are aggravated by exercise. You see he gives you a complete sketch of the early symptoms of calculus; and how are you to distinguish them? By the history and by sounding. Thus, there is no history of the descent of calculus from the kidney, nor of gravel previously passed. But there is the fact of a chronic gonorrhœa resisting, perhaps, months of treatment. And if the patient shows no improvement, you must not decline to sound him. You do so, then, if really doubtful as to the nature of the case—not otherwise—and will find nothing, but that the prostatic urethra is very sensitive, and you make him worse, perhaps, for a day or two. Therefore avoid the process, unless you are really in doubt whether the symptoms are not due to stone.

What is to be done? First and foremost, as a rule, having thus settled the question, abjure all instruments, which in most cases can only do mischief. Treat it as you would a chronic inflammation of the ear or eye—i.e., blister an adjacent surface; make a small blister every four or five

days on either side of the raphé of the perineum, by applying with a brush the Liq. epispast. of the British Pharmacopœia (a solution of cantharides in ether), not so freely as to distress him or prevent locomotion, and continue the plan for four or six weeks. I have found the best results from this method, combined with a tonic medicine and regimen; and you will find the patient himself gladly exchanging the dull weary aching in the perineum for the smart of the blister, and cheerfully noticing how the former gradually subsides under the influence of the latter. In another class of cases where the prostatic urethra only and not the gland itself is affected, and obstinate gleet persists, the application of a solution of nitrate of silver, not more than one to five grains to the ounce of water, for ordinary cases, to the prostatic urethra, may be very serviceable, if applied with care and all the gentleness you are master of, by means of an instrument fitted for the purpose. This may be the instillation syringe already described, or a catheter with a perforated end, and an india-

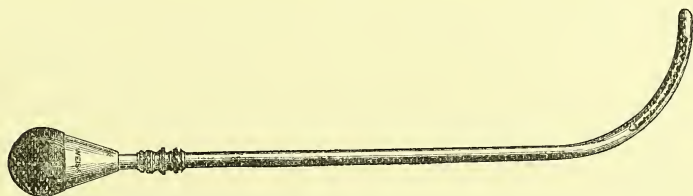


FIG. 98.—Instrument for injecting the prostatic urethra.

rubber ball at the outer end containing about two drachms. In exceptional examples where seminal emissions obstinately occur with far too great frequency, a solution of twenty grains or more may be employed with advantage, and by preference with the last-named instrument (see fig. 98).

I shall in my next lecture proceed with Diseases of the Bladder.

LECTURE XXVIII.

DISEASES OF THE BLADDER : PARALYSIS ; ATONY ; JUVENILE
INCONTINENCE.

GENTLEMEN,—Two patients have been recently admitted to my ward, and both were affirmed to have ‘paralysis of the bladder ;’ such, at least, is the statement that accompanied them here. On examining one of them, we found a not unhealthy-looking elderly labouring man, from whom, by much questioning, we elicited the following facts : That he is nearly sixty years of age ; that he has passed his water much too frequently for four or five years ; that he was much disturbed at night to do so, although lately some urine has come away without his knowledge during sleep ; that when he makes an effort at work the same thing often happens ; that the stream when passed by voluntary effort is weak, falling almost perpendicularly ; that he has ‘no particular pains,’ but has gradually become weaker of late ; and that for the last few months the urine has been cloudy, and has had a disagreeable smell. With all this his ordinary functions had been fairly performed, and he had followed his daily labour until three weeks ago.

The man was desired to unfasten his dress ; as he did so you remarked a urinous odour, and that certain cloths, which did duty for an indiarubber receptacle—a luxury beyond the means of our patient—were wet with the secretion. Two conditions only could cause this unhappy state of things : either the bladder was incapable of performing its office as a reservoir, and permitted the urine to escape as fast as it entered from the ureters ; or the viscus was unable to expel its contents, so that it was over-distended by them, the surplus oozing out, or being forced out, in the manner described.

Now, a glance of the eye might have nearly sufficed to settle this question. I pointed out a marked protuberance above the pubic symphysis; and after placing the patient on his back, the dulness by percussion corresponding with the situation of the bladder, and the clear bowel-note all round, diminished the doubt that this was a collection of fluid, if any such doubt still existed. Nevertheless, this was not quite all that it was necessary to know; it was just possible that the swelling might be a solid tumour of the bladder, occupying its proper space and much more, and so destroying its function as a reservoir. To the hand, however, the protuberance was clearly made up of fluid; but even an opinion so formed falls short of absolute demonstration, for the most practised hand has been known sometimes to 'lose its cunning,' or to have found a too deceptive quality in the object handled. But lastly, on applying the now necessary test, you have seen that a well-curved gum catheter glided into the bladder, and that upwards of 40 ozs. of somewhat stale urine flowed off: meantime the suprapubic enlargement had disappeared. I then examined the prostate, and found no very obvious enlargement.

Now, was this a case of 'paralysis of the bladder'? Certainly not. The history of the patient showed that he had had no seizure of any kind, and I beg you to understand that without some change in a nervous centre there is no paralysis of the bladder. Recall, if you please, what I said in my ninth lecture (p. 117) on this subject. This term is applied, or rather misapplied, every day to such cases as the one before us, and with the result not merely of masking the true pathological state, which ought always, if possible, to be correctly indicated by a nosological term, but of misleading the inquirer, since it indicates a condition which by no means exists.

What, then, is the defect or disease occasioning the symptoms in this case? Probably, Atony of the Bladder. I will speak presently with more precision. The bladder fails to expel its contents in the two following conditions, the first of which consists in the presence of a growth from the prostate, by no means necessarily large, but which obstructs the neck, so that the natural power of a healthy bladder—or even of one reinforced against the obstruction by hypertrophy—cannot

propel the urine by or over the enlargement into the urethra ; the second condition is constituted by lost or diminished power of contraction in the muscular coat of the bladder (no prostatic obstruction being present), so that its propelling power is lost or greatly diminished, the organ being sometimes merely a thin flaccid bag, unable to exercise expulsive force upon its contents. In this condition the bladder is said to be affected with Atony.

These two conditions, enlarged prostate and the atonied bladder, naturally often occur together in the same individual. While hypertrophy of the bladder more commonly takes place in connection with obstruction caused by urethral stricture, it also sometimes accompanies enlargement of the prostate. On the other hand, the latter condition, prostatic obstruction, is frequently associated with thinning, dilatation, and atony of the coats of the bladder. But when there is no disease of the prostate atony may be sometimes produced, and then it arises mainly from the subject of it having been placed, habitually or occasionally, in circumstances which obliged him to retain his urine for a too considerable period, so that the bladder became over-distended, and has failed subsequently to regain its natural power of contracting. Unfortunately, a single error of this kind will sometimes produce an atony, which becomes irremediable if discovered too late ; the distended bladder having been permitted to remain too long in that condition without relief.

Now, on further questioning our patient, we did not find that he could recall any such instance, or that he had ever formed the habit of permitting such over-distension. Neither did the affection occur suddenly ; on the contrary, the symptoms appeared gradually. What is still more significant is, that they occurred at that time of life when prostatic enlargement mostly commences, if it appears at all. Still, the prostate was not obviously large on examination by the bowel. We arrive, then, at the following conclusions : That this man has some enlargement of the prostate, which, though not obvious in the rectum, consists in a small nipple-like projection of the median portion, occluding the neck of the bladder, and that, from the size of the bladder, as just now demonstrated by percussion and by its contents, its walls are thin,

and have lost their contractile power ; in other words, that they are in a condition of atony.

I think there is no escape from these conclusions, and I beg that you will not only never permit yourselves to allude to this condition as 'paralysis,' but that you will protest against so loose and improper a use of the term when you hear it thus applied by others. Now, true paralysis of the bladder occurs from injury to the spine, and also as one of that group of phenomena which results from chronic disease in the cerebral or cerebro-spinal centres. You will then probably find it associated with impaired power of movement or an unsteady gait, with defective articulation, or with some of the slighter signs of such central mischief, as well as with those which are more obvious ; and I have even found it persisting after all other signs have nearly—I cannot say quite—disappeared. I need hardly tell you that such impairment of power, due to disease in a nervous centre, may be, and commonly is, a very serious matter, and should lead you to investigate the history of the case with care and intelligence. You must seek for evidence of the presence of slight defects in the supply of nerve power to the bladder, usually associated with other slight local signs, indicating that chronic change is taking place in some part of the nervous system. Thus, a man about middle age, say fifty years, and therefore before true senile enlargement takes place, states that for some time past the act of relieving his bladder has gradually required greater effort for its performance than formerly ; that the stream has become habitually small and feeble ; sometimes that the frequency has increased, sometimes the reverse, for he may feel no want to pass it ; generally he has no pain ; the urine is healthy in appearance, and by tests. The stream, moreover, does not cease definitely, for after a little waiting and repeated effort, more urine can always be expelled, and the act may be considerably prolonged before the sense of having finished arrives, which, perhaps, after all, is not experienced. The local sensibility is diminished, for the consciousness of passing a stream is slight, a situation differing greatly from that which pertains to the small stream of stricture. Examination shows a healthy urethra, and can detect no physical deviation from the normal

state of the bladder, prostate, and rectum. There is no history of over-distension, but the catheter finds two or three ounces habitually remaining in the bladder after a prolonged attempt to empty it. This may turn out to be the beginning of a very grave history. It may be the first indication of that affection of the cord known as *Tabes dorsalis*, since that malady is known in a few exceptional instances to be manifested by vesical incompetence at the outset, a symptom which appears at the close of the series of events which constitute *tabes* in the usual order of their development long after the gait and the vision have been affected. Examine the patellar tendon-reflex action, for its absence in such a case would go far to indicate that the condition described was an example of the kind I am describing.

In these circumstances, as in any other in which the bladder appears unable to expel all its contents, it is your duty to ascertain the fact by introducing the catheter; and if the defect be considerable, as in the case before us, it is essential to empty the bladder by means of the gum catheter, to remove the urine completely at least three or four times daily. This is not merely for the purpose of preventing retention and decomposition of the urine, but in order to afford to the muscular coat a possibility of re-acquiring power, which does not exist so long as that coat remains constantly distended by the retained urine.

Next, for the treatment of pure atony and for slight paralysis, uncomplicated with prostatic enlargement, a little aid may be sometimes afforded to the patient through the agency of electricity, by cold douches and injections, and by tonics; but less advantage is to be derived from these remedies, in my opinion, than some have appeared to believe, although I by no means say they are not sometimes serviceable. I have seen an increase of expulsive power attained rapidly during the daily application of an electro-magnetic current to the bladder, made in the following manner: To one pole the ordinary handle and moist sponge are attached, which is placed over the lumbar vertebræ; an elastic bougie, containing a conducting wire, and tipped with metal, is attached to the other pole, and is introduced into the bladder. A weak current is set going, and its effects watched, as at first a

slight sensation only is to be produced. This accomplished, you should move the bougie about gently in contact with the walls of the bladder, the urine having been just withdrawn; and, finally, let it rest a little in the neck of the bladder, where greater discomfort is felt: in all, allowing the current to pass for eight or ten minutes before withdrawing. In no case is any notable irritation to be produced by this agent.

A very different condition from that just described sometimes results after severe local injury to the bladder—viz. inability on the part of the organ to act in any way as a reservoir. In this unfortunate situation the urine leaves the organ by the urethra as fast as it enters by the ureters. This is complete incontinence, in the true sense of the term. Little else than mechanical contrivances are of any avail. And these consist in making an artificial reservoir of some kind, mostly of india-rubber, outside instead of inside the body; one which can be emptied at the patient's will. Happily, such cases are very rare.

But there is a partial incontinence which is very common and which is, moreover, amenable to treatment. You will be consulted by an anxious mother, who, bringing her boy, or a girl, of any age below puberty, and occasionally above that period, tells you that every night, or nearly so, this young person 'wets the bed.' Examples of this are frequently seen in our out-patient room. You know that, in a child with a busy excitable brain, muscular movements occur during sleep of a much more active character than those which usually occur in the adult, or in children of a more placid temperament. Anything up to somnambulism may take place during sleep in a child whose physique is weak, and who is the subject of a restless, ceaseless activity of mind; and micturition during sleep often occurs in connection with this state. Clearly, however, not only in such cases; for in some very dull and stupid children, in whom intelligence appears to be below the average, the same thing may happen. And it must also be admitted that there are cases which do not fall into either of these classes. There are children enjoying excellent health and spirits, who have no other known defect than the one in question. In some instances the occurrence has made

its first appearance under the influence of temporary derangement of the urinary function, or of the nervous system affecting it; and is subsequently repeated simply by the force of habit, after the exciting circumstances have disappeared. I am inclined to believe that this is the sole foundation for the presence of this uncomfortable infirmity in some of the children I have seen.

For the cure of these unfortunate patients all sorts of remedies and all kinds of management have been adopted, including even a periodical employment of the birch—a species of ‘cytisus’ which I trust you will never admit into your own therapeutic scheme. Depend upon it that ‘punishment’ for this form of youthful frailty will not answer; and whatever of strength to the moral faculty may be communicated in obedience to the ancient injunction not to spare the rod—a question beyond our province to discuss—do not regard it as binding on us who practise the healing art. The child’s attendants often lose patience at the perpetual recurrence of the disagreeable infirmity, and believe it to be the result of wilfulness or of carelessness. I have seen much cruelty practised, even by the nearest relatives of these unhappy offenders. Give it no countenance whatever.

But treatment on rational principles may effect much good, and is often completely successful. Thus for the class of excitable children, developing too rapidly the mental powers, you will seek to cultivate the physical side of life; to remove as much as possible the sources of over-mental stimulation; to strengthen the constitution through the agency of diet, or sea-bathing, or open-air life in the country if possible; combining perhaps with these advantages some medicine in the form of steel wine and cod-liver oil. For class the second—those of torpid and deficient intelligence—you must make their relatives or teachers understand the importance and the art of developing what mental power the child possesses. They should also endeavour to call the will into play as much as possible, and enlist it to aid in preventing the act. These are the children who are usually ill-treated, and often made worse in consequence; instead of which they are rather to be made sensible of the importance of losing the habit, so as to get a stimulus for volition in relation to it. Here remedies

which act specifically on the organs are most appropriate ; although these agents are useful in both classes.

First and chief is belladonna ; which partly paralyses the expulsive muscles of the bladder and controls the sensitiveness of the organ at the same time. Thus, in elderly people, who have feeble power to expel the urine, a dose often produces complete retention, lasting occasionally some time, and unaccompanied at first by consciousness of inconvenience from it. For them it is often disadvantageous, in certain circumstances pernicious, for it destroys the little natural power still remaining. But here we have to repress undue activity. Hence to these young patients you should give the tincture in small doses at first, in the afternoon and at bedtime, soon adding a third dose in the forenoon, and increasing them gradually to a considerable extent, if necessary, until the influence of the drug is quite manifest. A child of seven years of age may commence with six-minim doses, adding a minim to each every third day. A boy of twelve years may commence with twelve or fifteen minims, to be augmented gradually. At this age up to puberty, the dose should be increased, watching meantime its effects, up to twenty-five or thirty minims three times daily. If thus at length the bladder is made to retain the urine all night for a time, a new habit is formed in place of the old one, and it is probable that retaining power will persist on discontinuing the medicine, which, however, should always be done by degrees. This remedy is so excellent that it has almost superseded blisters to the sacrum and such counter-irritants. After it, *nux vomica* may be tried. A combination of belladonna with strychnia, say one forty-eighth to one thirty-sixth of a grain, has succeeded with me after failure by the latter alone. For others, a combination of either remedy with the wine or the tincture of iron may be useful, according to the condition of the patient. In all cases the diet should be carefully attended to ; and constipation should be guarded against, and the digestion of simple food be ensured while these medicines are taken.

When such measures fail, and particularly when the patients are approaching or have passed the period of puberty, a mild caustic solution should be applied to the prostatic

urethra by instillation, say, ten grains to the ounce, the application to be repeated, and perhaps with a stronger solution, if necessary. This may be used for either sex: for boys, the passing of a soft bougie every second or third day for a few times, leaving it in the urethra two or three minutes at a time, suffices sometimes to arrest the habit. When the prepuce is very long and cannot be easily retracted, a complete circumcision should be performed.

But in connection with all treatment, do not neglect to inquire for derangements of digestion, and seek their cause, which may consist in sheer neglect of the child's diet and regimen from carelessness, or from simple ignorance on the part of parents or nurses. And in this way it happens that intestinal irritation may cause incontinence during sleep; and another form of this cause is sometimes the presence of worms in the bowels. Of course you will take care that the young patient does not consume too much fluid, either in the form of alcoholic stimulant of any kind, or in that of tea; substituting cocoa, or milk and water, as without diuretic influence. Little fluid of any kind should be taken in the later part of the day; and the bladder should be emptied as late at night as possible, by taking up the child to pass water when the attendant goes to bed.

The condition of these cases sometimes demands close investigation, and attention to all the habits of the children and of their attendants. It becomes especially important if the complaint continues up to the period of life when young people leave home for education or the business engagements of life.

We shall return to the maladies of the adult in the next lecture, which will be devoted to a subject which is assuming fresh importance and a new interest for the surgeon, viz. the investigation of some obscure vesical conditions, leading to a consideration of Tumours of the Bladder.

LECTURE XXIX.

THE OPERATION OF EXPLORING THE BLADDER BY PERINEAL SECTION OF THE URETHRA (DIGITAL EXAMINATION) AS A MEANS OF DIAGNOSING OBSCURE VESICAL DISEASE.

GENTLEMEN,—I am now about to call your attention to an important proposal, which I made a few years ago for the purpose of investigating certain exceptional cases of obscure disease in the bladder, or closely associated therewith. It was new, appeared to be somewhat heroic at first sight, and therefore encountered some opposition at the outset. It was no less than the performance of a cutting operation (a slight one, no doubt) in the perineum, sufficing to admit the entry of an exploring finger into the membranous urethra, and thence to the cavity of the bladder; and this to be done with the sole object of exploring its condition. The operation itself was not a new one, is indeed ‘as old as the hills;’ well known in France and elsewhere as the ‘boutonnière,’ and often formerly employed for retention of urine.¹ The object with which I proposed it, viz. for diagnosis only, was quite new; while the circumstances in which I advised it to be used were those in which such an operation had not been undertaken before. Hence the little misapprehension respecting it just referred to, now passing away, the applicability and utility of the proceeding being now admitted pretty generally.

But at the outset I desire you clearly to understand that

¹ A curious habit has arisen of late among some persons of referring to this perineal incision in the median line as ‘Cock’s operation.’ Nothing can be more erroneous than to attribute the invention or first application of it to my old friend Edward Cock of Guy’s Hospital, known to me when I was a student, and still living, although retired from professional activity; and none, I am sure, would be more ready to disavow that relationship than himself. The operation, if so it is to be termed, was practised for centuries before the French named it the ‘boutonnière,’ which term has been employed at least 200 years.

the method in question is not to be resorted to with anything like frequency in urinary diseases; nor indeed is it to be thought of in any single instance, until we have failed, after prolonged and intelligent inquiry, by the means ordinarily adopted to ascertain the nature of these affections. But I suppose that all of us, including even those who have profited by a large experience, must confess that now and then a case is presented manifesting severe and obstinate symptoms of urinary disease, of which, although a careful examination has been made eliciting all the facts which an exhaustive inquiry discovers, we are unable to make a rational diagnosis, or materially check the progress of the complaint. In a great majority of cases, however, the ordinary investigation enables us, at all events, to decide in which of the three principal divisions of the urinary organs the disease is chiefly situated; whether in the vesical, the ante-vesical, or the post-vesical region. I say 'chiefly' because morbid changes may exert influence or extend beyond the limits of a single division. Let me briefly explain here that the vesical division comprehends, of course, every pathological condition affecting the bladder; that the post-vesical division embraces all affections of the ureters and kidneys; while the ante-vesical division denotes all diseases to which the prostate and urethra are liable.

Such a classification is a natural one, and it is from a practical point of view desirable to determine at the outset of the inquiry this question of locality.

It will be obvious to every student that the situation of the last-named, or ante-vesical group, enables us to make a physical examination there, i.e. of the urethra and prostate, without difficulty; and that there ought to be little doubt as to the diagnosis of any disease in that region, although we may not be able always to affirm or deny the presence of some vesical or post-vesical affection also, in addition to the more obvious affection.

By way of indicating a typical example of the cases which are presented for careful investigation, because the affection has already been found to be obscure, let me suppose a patient before us, who may belong to either sex, and who may be an adult of any age, and of whom the following particulars are affirmed:

He or she is the subject of unduly frequent micturition, both by day and night; the act itself is almost always painful, while pain, or at least uneasiness, more or less constant, is felt about the loins or pelvis. Then hæmaturia occurs with frequency, and is more considerable on some days than on others; but besides blood, the urine contains also pus and mucus. The signs and symptoms named have existed for a considerable period of time, and although varying in intensity from week to week have notably increased during the last few months. It has been made manifest also that the condition is not the mere sequel to an attack of acute cystitis, or to local poisoning as by gonorrhœa or the like; nor is it the result of any mechanical injury.

The method of inquiry best calculated to elicit ascertainable facts in such a case consists in solving the following questions, and these are placed in the order in which it is generally best to determine them:

1. Has the urethra a sufficient calibre? To be ascertained by means of the bougie.
2. Does the patient empty the bladder by his natural efforts? To be ascertained by passing a catheter immediately after the patient's natural act of micturition.
3. Is any enlargement of the parts, either prostatic or vesical, notable on making rectal examination? seeking, of course, either the full, rounded contour of senile enlargement of the prostate, or the hard irregular nodules of a cancerous growth.
4. Can the presence of a foreign body in the bladder be demonstrated by the sound, or can any other abnormal condition be thus detected?
5. Are the signs of renal disease present in the form of constitutional albuminuria, habitual exfoliation of casts of tubes, &c., or are there grounds for suspecting the presence of a calculus in the kidney, or possibly in the ureter, or of an abscess or tumour there?

Now, the whole of these queries may be answered in a sense favourable to the patient; in other words, no evidence of the presence of organic disease may be elicited by any one of these inquiries; nothing, indeed, discovered beyond the simple facts which constitute the group of signs and symptoms

complained of, and which are of themselves insufficient to determine the nature or the locality of the disease. Let me, however, remark here that observation of the urine from time to time sometimes reveals a sign of great importance not yet mentioned—viz. the presence in it of small fragments of tissue which, under the microscope, show structure resembling that of the papillomatous, formerly called ‘villous’ growths which occasionally spring from the internal coat of the bladder. There is another sign of great importance, second only in that regard to the presence of *débris*. The stream of urine issuing as usual of the normal tint sometimes changes to a florid red before ceasing to flow. Such an occurrence ought to be verified as fact by more than one observation. When it does occur the bleeding is always vesical or prostatic; when the blood is not only florid but rather plentiful, tumour of some kind is almost always present. Such evidence is highly significant when associated with the history and symptoms just described.

The conditions thus sketched, however, are not those of a common case. In the great majority of our patients a moderately careful and intelligent examination places beyond doubt by adequate demonstration the nature of the disease which produces the symptoms in question. Now, it is for the few exceptional cases already referred to, and these are always very important ones, with a history of hæmaturia manifestly not renal, with a history of treatment, too, by internal remedies reputed to be styptic, and beyond this chiefly watched for the development of more advanced symptoms, although hitherto without any purpose of surgical interference—it is for these cases, I say, that I propose to take a new and decided action. And I desire very strongly to submit also that such action ought not to be postponed until a stage has arrived when the operation of diagnosing and efficiently treating the disease may probably be accompanied by serious danger to life. And on this ground especially, that if the cause of the hæmaturia be tumour or growth of any kind, the issue will certainly be fatal, unless the disease can be removed by operation.

The first and essential step in the method I propose consists in examining the entire internal surface of the

bladder with the finger, by which means we can easily recognise the presence of any tumour, large or small, or even of any irregularity or roughness in the surface of the lining membrane, or the existence of any calculus lodged in a sac or sinus, or otherwise hidden from the researches of an ordinary sound passed by the usual route through the urethra. Of course it must be sufficiently obvious to everyone that the ability to do this easily, effectively, and safely, offers a valuable addition to the means ordinarily employed for the most difficult and hitherto intractable cases of urinary disease which come before us.

But you naturally ask me, Is it possible that such an examination can be effected on the terms just named; that is, with ease, efficiency, and safety? I have no hesitation in answering you in the affirmative.

I am, however, quite free to confess that a few years ago I should have been unable to make such a reply, and that it has only been after some unusual experiences which have fallen to my lot during the last few years, that I have satisfied myself that we can in most cases examine without difficulty the entire surface of the bladder with the tip of the finger.

Certainly before the discovery of anæsthesia the proceeding would have been impossible. But mere anæsthesia is insufficient: it is essential, in the first place, that the influence of the anæsthetic agent should be carried far enough to ensure complete relaxation of the voluntary muscles, so that their tension should not impede any action of the operator. This condition being fulfilled, it is, in the second place, necessary that the tip of the index finger should be placed just within the internal meatus at the neck of the bladder. Next, it is to be remembered that when the bladder is empty—that is, not distended by urine or by a calculus—the cavity presented for exploration is a small flaccid bag, sometimes merely a cul-de-sac, every portion of which is situate at a short distance from the finger placed in the position just described. Lastly, if the finger of the operator's left hand be maintained in that position, while he makes firm suprapubic pressure with his right hand, I maintain that there is no difficulty in bringing every portion of the internal surface of the

bladder successively into close contact with the tip of the left index finger : a contact which enables him at once to estimate correctly the condition of the interior, in relation to every important particular necessary to be ascertained.

Before considering the best mode of performing the simple operation which enables this exploration to be effected, I will anticipate an objection which may very naturally arise in some minds, viz. that we are not always able to reach the neck of the bladder with the tip of the finger when the incisions for removing a stone by the lateral operation have been completed. Hence it is notorious that a long and flexible index finger is regarded as an important element in the making of an able lithotomist ; yet, although possessed of it, he may still be unable to reach the point in question, in a few exceptional cases.

To this I reply that there are few bladders indeed into the neck of which, even when the prostate is large, a finger of ordinary length may not be introduced, if carried straight in from the centre of the perineum, which is the shortest route from the surface. But, in addition to this, I refer to the fact which I have verified by experience—viz. that firm suprapubic pressure made by the right hand of the operator, or aided by an assistant if necessary, will accomplish the object, even in an exceptionally deep perineum, if the index finger is firmly pressed up from the perineum to meet the other hand. Of course when large outgrowth of the prostate is present occupying the neck and cavity of the bladder, it may be impossible to carry the finger to the point desired ; but then it is to be remembered, that in such circumstances it must rarely be necessary to make incisions in order to explore the internal surface of the bladder, the case not being an obscure one, but, on the contrary, quite unmistakable after an ordinary examination has been made.

Let us now consider the manner of operating, so as to place the tip of the left index within the neck of the bladder. The first object to be attained is the opening of the urethra at or about the membranous portion, by the simplest and shortest route from the surface of the perineum, making a passage only sufficing to admit with ease the entry of the forefinger and no more. There can be no doubt that a vertical median incision—that

is, one made in the line of the raphé—will fulfil this indication better than any other. In this situation the prominence which is formed by the bended knuckles of the operator, when introducing as far as possible the index finger, lies in the hollow equidistant between the two nates, and can be pressed in between them, directly towards the centre of the bladder. Any incision made right or left of the median line must of necessity lead obliquely to the centre, and be therefore a longer line, because it commences at a point on the external surface more distant from the neck of the bladder than is the raphé of the perineum. Accordingly I prefer, and always employ, a vertical incision in the centre of the perineum carried straight to the urethra, aiming at the point close behind the bulb—a procedure, let me repeat, which, as far as the incisions are concerned, has been practised by surgeons for centuries to relieve stricture, abscess, retention, &c.—objects, however, altogether differing from that for which I have employed it, and which is the subject of our consideration here.

The patient, then, is to be placed securely in the ordinary position for lateral lithotomy. A rather short, well-curved staff, with deep median groove, is passed into the bladder, and confided to the hands of a careful assistant. The operator enters the point of a long, straight bistoury about three-quarters of an inch above the anus, and makes a vertical incision upwards of the skin, or from above downwards if he prefer to do so, ending his incision at the point named, but not exceeding an inch or an inch and a quarter in length. Having introduced his left index finger into the rectum he introduces the bistoury with its back downwards, at the lower angle of the incision, pushing it horizontally inwards, nearly parallel with the upper border of the bowel, where his finger will guide him as to the relative positions of the blade and the bowel, until the point reaches the groove of the staff about the membranous portion of the urethra. He is next to incise the tissues covering the groove for about half an inch; when the knife is to be withdrawn, cutting upwards perhaps a little in the act, but with care to avoid any material division of the bulb. Then the index finger is removed from the rectum, wiped, and introduced into the wound, the nail insinuated

into the groove, while the tapering dilator or small gorget (fig. 99) is guided into it and pushed on to the neck of the bladder.¹ On this the left index follows, gradually dilating the urethra

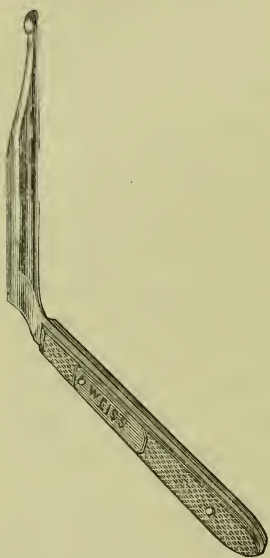


FIG. 99.—Tapering director or gorget.

as the staff is withdrawn when the finger enters the neck of the bladder. In the great majority of cases the last joint is felt free in the cavity while the proximal portion is felt to fill or nearly fill the entire wound, and it does so if the incisions have been made as directed. As a rule very little bleeding results. The operator now, maintaining his finger in the situation described, should rise from his seat to the standing position, place his right hand on the patient's abdomen, directly above the pubic symphysis, and make firm pressure into the pelvic cavity. He will soon recognise the end of the left index finger, and by concerted movements of the two hands he may, as I have already said, examine with ease the upper surface

of the bladder, and explore the lateral walls, the fundus and trigone; the latter more completely, if necessary, by placing the other index finger in the rectum. And sometimes he can explore more advantageously by remaining seated and allowing an assistant to make the suprapubic pressure with both hands, for him.

You will observe that the procedure thus described is simply a limited external urethrotomy, not a 'cystotomy,' as when incision of the neck of the bladder has also been made;

¹ I have been criticised for not laying great stress on the necessity for attention to this point, and have been charged with it as an oversight that I have not insisted here on careful disinfection of the left index finger after removing it from the rectum. The proceeding is wholly unnecessary, and I intentionally omitted the needless detail. Nothing in the rectum does the slightest injury to a wound. I have often pointed this out as illustrated by the wound of lateral lithotomy, placed as it is in close apposition to the rectum, not infrequently cut, and transmitting faecal matter daily through it from the first. Nevertheless, I have never seen the least injury accrue therefrom in these cases, and my opportunities of observing lithotomy cases have been perhaps almost unrivalled.

nor can it be regarded as similar to the incisions for the 'median' or any other form of lithotomy, since the division of tissues is far less extensive. The incision which I employ involves only a small portion of the urethra anterior to the prostate and neck of the bladder, which are left perfect and intact throughout. Hence its result is to enable the male bladder to be examined somewhat in the same way, but not so readily as that of the female in its natural condition; and in the female, as you know, dilatation of the urethra alone suffices to permit the finger to enter the viscus and explore it.

I first practised this exploratory incision in November 1880, for a case which I was unable to diagnose by the methods then ordinarily adopted. Do not misunderstand me: I had made the same incisions many a time for five-and-twenty years before, for the purpose of dividing stricture, giving an exit to urine, and the like. But at the date referred to I made for the first time this perineal urethrotomy, stating that I did so solely with the intention of exploring the bladder, because I was in ignorance as to the nature of its condition and contents. I then opened the urethra only, avoiding division of the prostate as in median lithotomy, in order to introduce my finger into the bladder, and most unexpectedly found a polypoid tumour there, which I was convinced I could at once remove with a pair of forceps, and I did so. This will be further described when we consider the subject of Vesical Tumours. Since that, and always with a similar intention, mostly in circumstances of great obscurity, I have performed digital exploration upwards of eighty times. In no case has a fatal issue been occasioned thereby. In upwards of thirty of these I have found tumour of the bladder; in four, impacted calculus in various forms; in the rest no remarkable pathological changes but those which were due to chronic cystitis, thickening of the bladder, and retained urine. In several of these cases, suspending the function of the bladder and urethra for ten or fifteen days, by withdrawing the urine through a tube in the perineum, has been followed by good results, which have continued more or less permanently afterwards, a subject discussed in a preceding lecture.

To revert to the operative procedure, let us suppose that, the incisions having been made, the operator's finger on

entering the neck of the bladder, and being pushed firmly in, recognises the presence of a soft protruding mass, or flocculent growth springing from some part of the bladder. If brought within reach of the finger by suprapubic pressure, it is easy to verify the nature of the peduncle, whether it be narrow or broad, together with any other physical characters which are obvious to the touch. These characters he must proceed to determine with great care, as upon the operator's estimate of them, thus attained, must depend his decision.

He will ascertain, first, whether the growth or tumour can be removed entire. Secondly, if not so removable, whether there are considerable masses protruding into the cavity which can be detached although the base must be left. Thirdly, he should be satisfied whether an attempt to separate the growth from the bladder, either completely or partially, may not involve a useless or hazardous operation, for example when the consistence of the morbid structure is too firm to be removed by any other agent than the knife, and thus he may be compelled to conclude that the safest course is to decline any further procedure. Fourthly, he considers and determines at once if a satisfactory solution of the difficulty may probably be attained by resorting to the operation above the pubes.

But now we will imagine that the result of a careful examination with the finger has convinced the operator that he can remove the growth by the opening already made. He will at once introduce by the wound, until the blade can be freely opened in the bladder, a pair of straight forceps, the extremities of which meet by serrated or roughened edges, so that they should nip off, instead of cutting, the most salient portions of the tumour. Those that I have designed for the purpose are shown at fig. 100. The extremity of each blade meets its fellow by a margin of about an inch long and about one-sixteenth of an inch broad, and these are indented so as to effect a separation of the morbid tissue with as little chance of producing hæmorrhage as possible. With this instrument the greater portion of almost all growths can be removed. But I soon met with a case in which a small growth protruded close to the neck of the bladder, and although with the forceps described I took away the protruding portions from the other

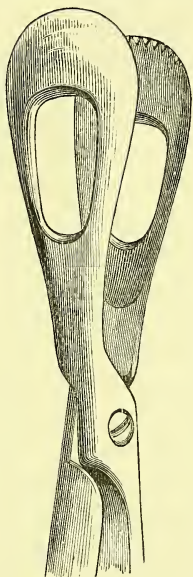


FIG. 100.—The forceps for removing tumours (No. 1).

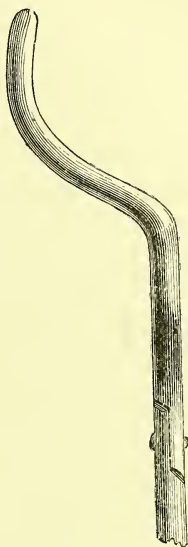


FIG 101.—Forceps (No. 2). For tumour close to the neck.

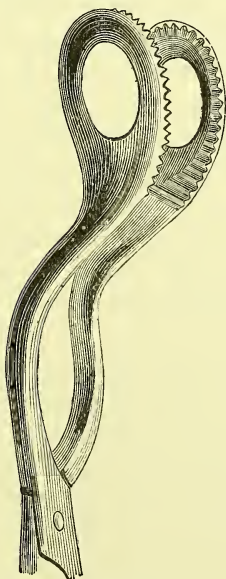


FIG. 102.—Curved forceps (No. 3) for tumours springing from the side of the bladder.



FIG. 103.—The same forceps, or No. 3. Front view, showing divergence of blades by joint, to prevent nipping of the soft parts at neck of the bladder when closed.

aspects of the bladder, I failed with this instrument to seize the small one close to the neck. For this I designed another forceps (No. 2, fig. 101). It will be readily seen that by means of this instrument it is easy to remove any growth in the situation described, and both forms should be at hand when making exploration of the bladder. Since the occurrence referred to I have operated in three other cases of large vesical tumour in the male, springing from the left side of the bladder not far from the neck. These I removed chiefly with the curved forceps (No. 3, fig. 102), the other forceps being almost inapplicable. Perhaps there are circumstances in which an *écraseur* may be a more efficient instrument than the forceps for removing a growth; these, however, I venture to believe, will not very frequently be met with. In order to adjust the cord or wire, more room is necessary for manipulation than the incisions described will furnish. It is better to keep these within narrow limits when it is possible, and such have sufficed me for the complete removal by the forceps of a very large tumour. The forceps and the finger are of course to be employed alternately, the one to define clearly what the other is to lay hold of; still on rare occasions I have found it necessary to make a wound large enough for both finger and forceps to pass in company. But the *écraseur* would always require an accompanying finger, and more space must of course be secured for their joint action, which I object to, because it is certainly undesirable to make extensive incisions. In such circumstances the suprapubic operation is undoubtedly to be preferred. In the female the finger can be more easily introduced when really necessary, because room is more readily acquired without section.

After the chief portions of tumour have been removed from the bladder, it should be washed out with a current of cool water, by means of a syringe and tube through the wound, after which a large vulcanised catheter is to be introduced, so that about half an inch lies within the bladder, and in this position tied by a stout bobbin to a bandage round the patient's waist. The other end protrudes some five or six inches, and is placed within a bottle, adjusted to receive the contents of the bladder. Hæmorrhage is usually free during a few hours, sometimes longer, and then generally ceases; pain is some-

times but not always severe, and should be controlled when necessary by a morphia injection. The tube should remain from two to five days and then be removed, when the wound rapidly heals, and all the urine soon passes by the natural channel.

I shall now add a short series of clinical illustrations of the employment of digital exploration for cases of great obscurity ; each consisting of a brief sketch of the results of examination, and of the ultimate issue of the case.

CASE A.—In the autumn of 1880, a man, aged 29, from whom I had removed a small calculus in the spring, was still under my care for unrelieved severe vesical symptoms. Exploring with a lithotrite I fancied I could get hold of some substance which I could not remove, and the sensation suggested to me an impacted stone. Finding I could not determine what was the cause of his troubles, I determined to make an incision resembling that for the median operation for stone, but as limited as I could, in order to solve the question. I invited Professor Seegen of Vienna and Dr. Paggi of Florence, who were staying in London, to be present. Having introduced my finger, my assistant making firm pressure above the pubes, I discovered a rounded tumour springing by a narrow neck from the top of the bladder ; it was about the size of a chestnut, and was coated with phosphatic matter. Introducing a child's lithotomy forceps, I seized it and twisted it off entire, with very little trouble. I watched him with great anxiety for two days, but there was no bleeding to speak of, no pain, no fever ; and he made a speedy recovery. He attended two years afterwards a meeting of the Royal Medical and Chirurgical Society, to show that he had not had any return of his complaint and was in perfect condition, local and general ; and he is so still (1888).

CASE B.—A gentleman aged 48, who suffered severely with frequent vesical bleeding for years : Perineal exploration, June 27, 1881, nothing found ; tube kept in a week, certainly better ever since, but not cured.—1887 : Remains now better than he had been for several years before the operation.

CASE C.—A gentleman, aged 68. I crushed a calculus for him March 18, 1881. He passed all his urine by catheter. In the autumn began to lose much blood, although he passed his

catheter easily. Early in 1882 I removed some phosphatic matter, but the bleeding continued as before. The condition being very serious, I requested Sir W. Jenner's opinion, and the exploration was agreed to, and performed February 10, 1882. The only thing I found was a rather large scale of phosphatic matter, adhering to the bladder, from which I removed it with my nail. The tube was left eight days, bleeding never recurred, and he went home free from all symptoms.—1888: He has enjoyed excellent health, both local and general, ever since, and has called to tell me so. He is 74 years old, leads an active life, and I never before saw him looking so well.

CASES D and E are those of two gentlemen, one of 60, the other of 83 years of age; the former described in Lecture XII., at page 152; both with severe cystitis due to prostatic retention; and both very greatly benefited.

CASE F.—That of a lady from whom I removed a papillomatous tumour. (See Case B, p. 427.)

CASE G.—A gentleman, aged 72, habitually passing a catheter for prostatic retention, sixteen or eighteen times daily, and suffering extreme pain. Seen with Sir W. Jenner. Operation advised and performed June 21, 1882, finding a small impacted calculus, which I removed. Relief to pain was complete. He died in a few days from exhaustion. The operation should have been resorted to long before; but he had declined the proposal until his suffering was unendurable, and his strength worn out.

CASES H and I proved to be the subjects of tumour, which was in each case removed.

CASE K.—A gentleman, aged 24, first seen in April 1882, who for about two years has suffered severely from pain, frequent micturition and bleeding. The stream often commences of the natural colour and becomes bloody before ceasing. Has been sounded and treated, but without benefit. After using various remedies, I advised exploration. On December 15, 1882, I performed in the usual manner. There was no tumour, but the whole of the mucous membrane of the bladder was much thickened and rugose. The tube was retained about five days. Hæmorrhage continues as before, and disappears only when a catheter is tied-in and retained, the urine then continuing clear and healthy. No benefit appears to have resulted from the proceeding. In such circumstances tubercular dis-

ease is usually the cause of symptoms, and if the presence of this can be determined, or may on good grounds be suspected, no operation should be performed.

CASE L.—A case of tumour found, and successfully removed.

CASE L.—A gentleman, aged 52, from Cape of Good Hope. Painful micturition for a year past and great frequency; no cause discoverable by any examination I could make. Urine purulent, no blood. Health excellent. Much treatment before coming over without result. No relief from medicine here.—January 22, 1883: The usual incision enabling me to explore entire surface of the bladder, and finding nothing; tied-in tube, which remained eight days, during which all pain ceased, and he slept as he had not done for months; symptoms gradually improving.—February 5: All urine by natural passages; pain gone; can hold urine much longer than before; greatly improved, and ultimately went home cured.

CASE N.—A case of tumour found and successfully removed, and ultimately sent home cured.

CASE O.—The following is a typical example of a rare condition which was greatly benefited by the operation. A gentleman, aged 45, formerly under the care of Dr. Mitchell, of Barnard Castle, Durham, came to me in April 1884, with very severe urinary symptoms. He was compelled to pass urine every half-hour night and day. Finding no adequate cause after a long examination, I advised exploration, and did it on April 14. I found nothing whatever in or about the bladder, except that the lower border of the orifice, on entering, was formed by a tight hard cord stretched across, very distinctly felt by the finger—and not formed of prostatic substance. It might be well termed an example of ‘bar at the neck of the bladder’ of the simple membranous kind. I divided it freely with the knife. He left me in three weeks, holding water from $1\frac{1}{2}$ to 3 hours; and the improvement was permanent. He called on me a year and a half afterwards to tell me that this was still his habit, and that it was ‘impossible to say how great the relief had been.’

CASE P.—That of a lady, aged 44, brought to me by Dr. Smith, of Dumfries, in January 1884. During two years pain and frequency of passing water, and lately blood had appeared.

The presence of growth had been suspected, a hard spot being felt in the floor of the bladder by vaginal examination.—26th : Under ether I dilated the urethra and explored the bladder with my finger, Dr. Smith being present. I found, growing apparently from the base of the bladder, a rather large hard protuberance, and considered the possibility of making an attempt to remove it entire. Prolonged examination, however, convinced me that it was an encysted calculus, and having cut into the swelling freely, with some difficulty, owing to its situation, I evacuated a hard calculus entire about the size of a nut. She made a steady recovery, and went home completely relieved.

I could have added many other interesting histories to the foregoing ; but shall rest satisfied with having presented you with a few typical examples of the results which may be obtained by digital exploration of the bladder in appropriate cases.

LECTURE XXX.

TUMOURS OF THE BLADDER; THEIR VARIETIES, SYMPTOMS,
DIAGNOSIS, AND TREATMENT.

I AM about to ask your attention to a class of diseases which have not, until a very late period, received the attention to which their importance entitles them.

I speak of tumours and growths arising primarily in the walls of the urinary bladder. I say this because you are distinctly to understand that all those outgrowths from the prostate which arise as the result of senile enlargement, since they are more or less composed of structure identical with or very similar to the tissues of that organ, however much these outgrowths may project into the cavity of the bladder, are not to be included in the class of vesical tumours; although formerly they were often erroneously so regarded.

True vesical tumours are generally considered to be of rare occurrence, and that is no doubt true as a general proposition. But they are more common than was formerly supposed, more so than the few specimens in our museums would seem to indicate. And I have good grounds for believing that under the nosological denomination, 'Hæmaturia,' to which, as a cause, a large number of deaths is every year attributed, the presence of vascular tumours of the bladder has been masked, although they have constituted the fatal source of hæmorrhage in an important proportion of the cases.

Like 'dropsy,' as I have before had occasion to remark—like 'irritable bladder,' the term 'Hæmaturia' designates a symptom only, and not a disease. And when you tell me that a certain patient 'is the subject of hæmaturia,' your statement has no other meaning than this, namely, that with his urine he passes blood, the source of which you do not

know. The term in question has no further signification, for if you knew that the blood came from the kidney, or by reason of a calculus, or from a vesical tumour, you would say so. And as the bleeding may take place from any part of the canal between the kidney and the external meatus, a vaguer term than 'hæmaturia,' if regarded as indicating the malady, can scarcely be employed.

I spoke of the rarity of these tumours in our museums. Still more rare are records of any operations performed for their removal in the male. The bladder of the female being more accessible, the presence of tumour there has been more obvious to surgeons, and removal has been practised occasionally for women, although even among them such operations have been very rare. Crosse, of Norwich, was one of the earliest operators for tumour, performing lateral lithotomy for it on a small child in 1834, taking away a portion only, and losing his patient. Billroth opened the bladder above the pubes in two male cases to remove a large and solid mass, having found it too large to withdraw through a perineal opening. This was in 1874, and one life was saved. Humphrey, of Cambridge, did the lateral operation in 1877 for a young man, removing a large tumour, and he recovered. The first instance in which I operated was in 1880, by a median incision in the perineum, involving the membranous urethra only; I removed a single polypoid growth, and the patient is at this moment enjoying perfect health and activity. Since that time I have repeated the operation many times, and shall refer to the results hereafter.

Now with regard to the varieties of product invading the bladder in the form of tumour, I may observe that, as with similar formations in other parts of the body, they are classified according to their histological characters, and also to their tendency to invade surrounding structures and reproduce themselves elsewhere.

Until recently most tumours of the bladder were supposed to belong to that class of various growths of which the type was known as 'cancer.' All these, as you know, reappear after removal with greater or less rapidity. And besides these, a single species was familiarly recognised under the term 'villous;' although by some this was relegated to the pre-

ceding class as 'villous cancer,' without any warrant however for doing so. It was well known to be a bleeding tumour which sooner or later produced a fatal result by its single, irrepressible function of continuous blood-letting.

Now this so-called 'villous growth' is in fact of all varieties that which most commonly affects the bladder, and it will form the most prominent in the series I shall now present, but under another name—that of Papilloma.

First, however, I shall briefly mention as the least complex form of growth springing from the vesical mucous membrane, the simple mucous polype; that formation of which the well-known nasal polypus is the type. It is very rarely found in the bladder, and has at present been only met with in that

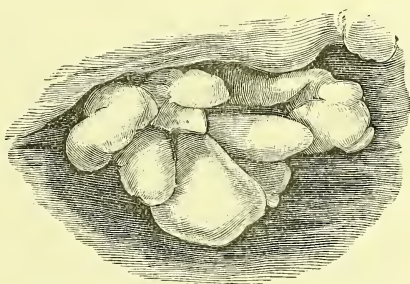


FIG. 104.—Simple polypoid tumour.

of the young child. Nothing more need be said of it here. (Fig. 104.)

Secondly, we come to the growth just referred to under the term Papilloma, and it is so called because its distinctive structure is that of an outgrowth from the mucous membrane in the form of papillæ, protrusions, tapering or rounded, of the natural structure and covered with a well-defined epithelium, spheroidal or more commonly cylindrical; each being provided with a considerable blood-vessel (figs. 105, 106). When the papillæ are long, slender and filamentous, floating out into the urine like slender-leaved aquatic plants, springing together in a group from a circumscribed base or stalk, they are termed 'Fimbriated Papilloma.' If the organ containing such a growth is examined in air instead of under water, the fimbriæ collapse, adhere, and form a soft, rounded scarlet mass resembling a strawberry, an appearance which is quite characteristic

(figs. 107 and 108). Sometimes only one of these masses is found in the bladder, sometimes two, three, or more coexist. Uniting the filaments especially at the base, there is always more or less fibrous tissue interspersed, mostly some non-striped muscular fibres also. Then sometimes the outgrowth expands in size, and has sufficient solidity to form a small polypoid mass, much firmer than the nasal variety just alluded to. It may have a single narrow pedicle, attached to the mucous membrane of the bladder, or a wider connection with

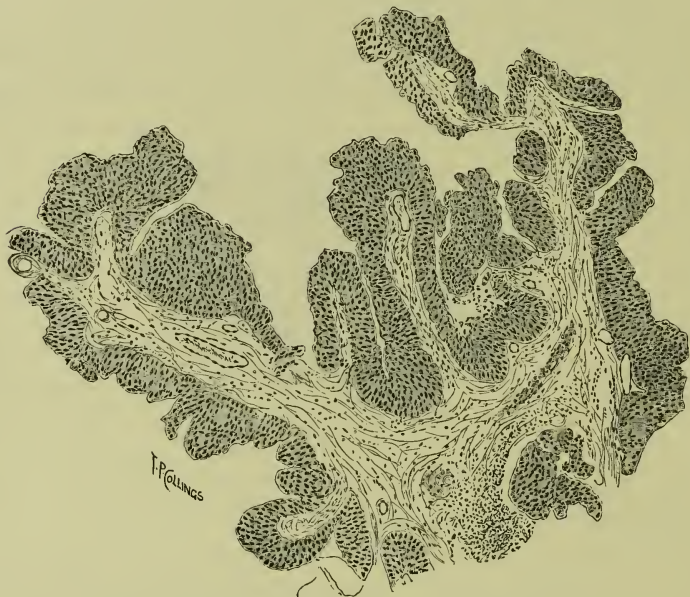


FIG. 105.—Papilloma. Microscopic. General view.

it, flat and sessile; or it may expand into two, three, or more rounded heads: I have seen one almost filling the cavity, and in form resembling a cauliflower. A few examples of all these which have been removed after death are to be found in our museums.

When there is a larger proportion of the fibrous structures named, associated in the growth, and it is denser in structure and wider in base than those just described, I have employed the term 'Fibrous papilloma' to denote it.

Fibrous papilloma, thus understood, is of course related

through insensible gradations to the fimbriated variety, although the two are essentially distinct in their nature, since

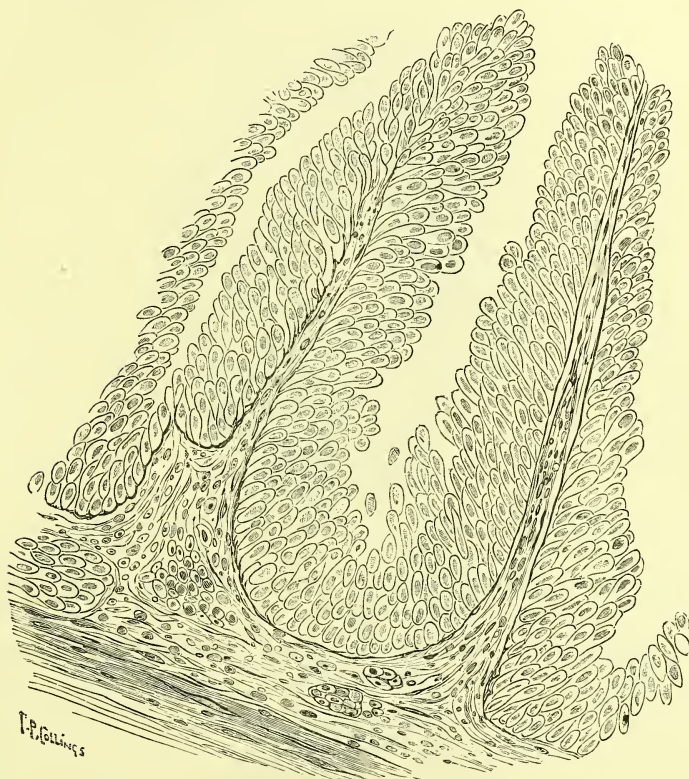


FIG. 106.—Structure of fimbriated papilloma, slender filaments; drawn from a specimen in author's collection. $\times 160$.

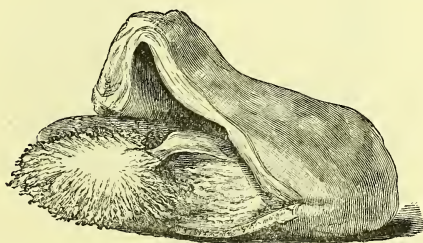


FIG. 107.—Fimbriated papillomatous tumour lying in opened bladder.

the last-named growth will remain for years retaining its simple structure, only growing larger, and not necessarily

acquiring further density with age. A characteristic fibrous papilloma is a somewhat solid growth, and as such may form

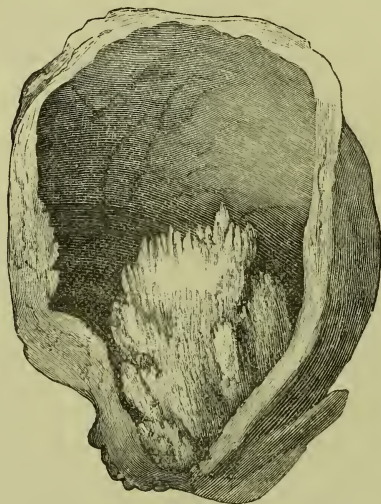


FIG. 108.—Fimbriated papilloma, a second example.

a considerable mass, with only a small proportion of fimbriated papillæ on its surface (fig. 109).

And here let me tell you that these fimbriated papillæ may be found attached to the surface of any vesical tumour, even

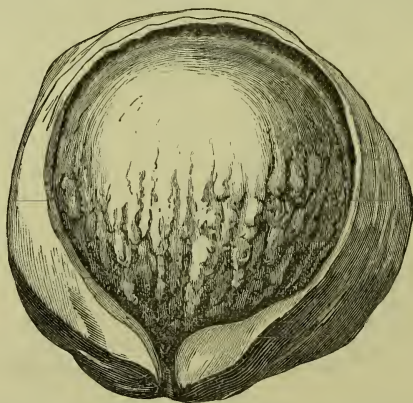


FIG. 109. Fibro-papilloma, filling the bladder; an unusually large specimen.

to some forms of malignant growth, apparently as accidental adjuncts, the true character of the tumour being unaltered

thereby. And this is a matter of importance in relation to diagnosis, and obviously indicates the necessity for caution in forecasting the result of operation, since a specimen of papilloma in the urine, while it proves the presence of that growth in the bladder, does not absolutely bar the possibility that a more serious growth may be there also. Happily, however, it is very rare that the innocent growth is accompanied by the malignant one.

Next; occasionally a tumour is found springing generally from a wide base, rounded in form, firm in consistence, not large, although some such have been met with, the chief constituent of which is organic muscular fibre such as that which constitutes the contractile coat of the bladder itself. This is termed Myoma. It may be more or less intermixed with bands of connective tissue, and it may have fringes of papilloma on the surface; but the distinctive character found on examination determines its classification as a muscular tumour.

In examining the foregoing tumours, a few are met with in which other elements occasionally appear; viz. a large quantity of small nucleated cells may be found interspersed, or grouped among the constituents of the fibrous stroma forming the denser portions of the tumour; and sometimes cells of irregular form, not apparently belonging to any normal type. And such a structure always arouses suspicion that the growth is not so innocent in its tendency as simple papilloma, and may not improbably be reproduced after removal. It suffices for the present to speak of these as forming Intermediate Transition or 'fibro-cellular' varieties, and thus we approach the borders of the next group of morbid products.

This class comprehends those growths of which the structure is largely composed of epithelium in varied or modified forms; and their tendency is to invade and infiltrate, by gradual or by rapid increase, all adjacent structures. Among growths of this character, epithelioma appears not infrequently to affect the bladder, and its course is probably not more rapid there than it is in other parts of the body. Scirrhus is somewhat more rare, and is easily detected by the irregular outline and dense hardness of the deposit, when examined by finger introduced into the rectum. The more rapid and larger

growths formerly grouped as encephaloid, and now defined as round-celled and spindle-celled sarcomata, are certainly rare in the adult: they affect the prostate and bladder of children occasionally, who appear not to be subject to the other forms of malignant disease.

Lastly, that rare product dermoid tumour has been found in the bladder. One such case I have seen, and two or three more are perhaps on record. The tumour in question was successfully removed by my friend Mr. Bryant of Guy's Hospital, with whom I saw it in consultation.

Now the symptoms of a tumour in the bladder present nothing special at the outset: a little undue frequency of micturition is commonly the only sign at first, and of course excites no suspicion as to the real cause. But early in the progress of papilloma, which I have already said is by far the most generally met with, there is an important sign, characteristic of it throughout its entire course, and common to most other tumours at a late period, namely, the appearance of blood in the urine. A single hæmorrhage occurs, after exercise perhaps, and so resembling that from calculus, the presence of which is often suspected. Only there are two points of difference between the two affections, you may advantageously note. First, the hæmorrhage from papilloma is generally much more abundant than that of calculus; and secondly it is, at all events at an early period, mostly unaccompanied by pain and irritation of the bladder.

As the case advances, attacks of hæmorrhage, which at first occur with long intervals, become more frequent; pain however is still rarely a prominent feature, unless obstruction to the outflow of urine is occasioned by clots. Such a history should always arouse grave suspicion. The symptoms described have very commonly until recent time been attributed to 'congestion of the kidney,' a comparatively rare cause for such hæmorrhage, without the presence of other symptoms than those we have been considering. And a careful inquiry should be made in order to determine the diagnosis. Endeavour first to learn whether the patient has ever observed that the act of relieving the bladder sometimes commences by his passing urine natural in appearance, while towards the close it becomes stained or mixed with florid flood. If so, the

source is vesical, possibly prostatic, at all events not renal, and probably the result of tumour. When blood comes from the kidney it is almost invariably mixed with the urine, and, unless very recent indeed, it is brownish not florid in tint. Occasionally, although very rarely, florid blood may appear first, and clear urine afterwards, but the reverse is the almost invariable rule. 'I begin with lemonade,' said a well-known public man to me a good many years ago, 'and I leave off with port!' and some time after he died of cancer of the bladder. Many a time I have verified this condition since, and I now regard it as a valuable pathognomonic sign of hæmorrhage from some portion of the bladder. Secondly, a diligent search must be made for tumour-débris passed in the urine by microscopic examination of it, and before long, if it be present, the characteristic appearance of papillomatous structure will be discovered. The bladder may be washed out with plain water, especially after an examination by sounding, in order to obtain the evidence in question. (For the nature of the structures found see figs. 105, 106.) Portions may be met with, a glance at which enables you to affirm without hesitation the presence of a papillomatous growth in the passages, and its site may safely be assumed to be the bladder.

But you may say, 'Why not sound the bladder, as we do for a stone, and determine the question thus?' For this reason, that the question is not thus determinable. The soft floating tissues, even when springing from a thick base, yield no evidence to the sound, nor does rectal examination afford a sign unless the bladder is filled by the growth, when the organ feels rounded, but very soft as if filled with fluid. On the other hand, when there is a cancerous growth involving the bladder to a notable extent, a well-defined mass of irregular outline and of hard, unyielding consistence almost invariably presents itself to the finger in the bowel. Whenever this is met with, a condition so different from the rounded and yielding mass presented by senile enlargement of the prostate, there need be little doubt as to the very grave fact indicated, namely, the presence of a growth occupying the walls of the bladder itself, and irremovable by art. If on this point you are in any doubt, you may introduce into the bladder the short-beaked sound, and with the finger in the rectum care-

fully explore the thickness of the structures intervening between the finger and the sound. Next, the sound being still in the bladder, or the finger being placed in the rectum, you will not find much difficulty, provided the patient is thin, in gaining some information of a like kind by palpation above and deep pressure behind the pubic symphysis. Then, by movements of the sound itself, you may be able to detect a hard mass of scirrhus on either side of the vesical walls, the sound not turning over readily to the left or right as the case may be. But I repeat, you will not thus discover any papillomatous growth, for it will elude the most delicate traversing of the cavity which can be achieved. Even an epithelial growth, which is usually wide in its base, of flocculent surface, and sprouting into the cavity, although not very luxuriantly, is so deficient in induration as not to be readily discoverable. It scarcely destroys the flexibility of the vesical coats, which is the fact you have to ascertain. Then you may perhaps discover by searching laterally within the bowel, or externally in the groin and iliac regions, some indurated glands, but they are palpable only in advanced cases of cancer; and you may also obtain such light on the subject as a search for such growths in other parts of the body may afford you. Thus, not long ago, I had my diagnosis of cancer of the bladder in the case of an elderly patient made certain by the appearance of a secondary growth springing from the cranium. Moreover, one important sign of malignant disease is mostly present in these cases—viz. large and often rapid loss of weight by the patient. If this is not present in a doubtful case, you can afford to take generally a hopeful view: if on the contrary it is manifest, the prognosis is graver.

Microscopic research in these cases affords less positive evidence than it does for the papillomatous growths. Much has been formerly said of the necessity of seeking what is called the 'cancer-cell,' but the physical signs I have just described alone are trustworthy, and almost always suffice. Sooner or later severe pain, hæmorrhage, and obstruction to the stream, appear and manifest the progress of the malady. Do not then lose sight of those broad features of the case which are to be determined by the unassisted eye and touch, as applied to the body, and observe also the condition of the urine from

time to time. And you will probably find therein distinct masses of soft, almost semi-translucent structure of considerable size, passed by the urethra at micturition, and discover on examination that these evidently consist of rapidly formed cell growth, the cells of large dimensions, sometimes containing two or three nuclei, the observation of which will go far to confirm your suspicions of the presence of morbid growth aroused by the pre-existing symptoms.

The presence of malignant disease in the prostate is so closely allied to the vesical affection, that this appears to be the appropriate place to refer to it, and I shall very briefly add a word or two embodying the chief facts of importance. The prostate may be affected of course through extension of the disease from the bladder. It is, however, never thus affected by papilloma. Putting aside, of course, senile enlargement in all its forms, even those in which the outgrowths resemble large polypoid tumours (p. 111), the prostate is very rarely the seat of carcinoma. Primary scirrhus is exceedingly rare; 'encephaloid' is less so, especially among children; but the precise nature of the tumours formerly reported under this appellation it is not possible now to decide. In some of our museums, one is sorry to observe that specimens of senile enlargement are still not infrequently labelled 'scirrhus,' illustrating an old-fashioned use of this term, merely indicating hardness in the growth, and having no further pathological significance.

I must now deal with the important subject of treatment for vesical tumour. It must be regarded from two points of view.

First. Palliative treatment in relation to the existence or predominance of certain symptoms, which may be regarded as three in number: hæmorrhage; painful and frequent micturition; retention of urine.

Secondly. Treatment designed to extirpate the growth by some operative measures.

The first and most important mode of palliating the disease is obviously by checking or suppressing hæmorrhage. For this purpose I shall first name the internal astringents; that is to say, those which are administered by the mouth, as gallic and tannic acids and the acetate of lead, for which indeed little is to be urged in the way of commendation. I cannot

say much more for any styptic I have ever tried in connection with these cases. If any agents are less disappointing than others, I should name the following as examples. Common alum, the iron alum, and an infusion of matico; of either alum salt you may give from ten to fifteen grains three times a day, with ten, fifteen, or twenty minims of sulphuric acid, and enough syrup to make it palatable; and it certainly is so, and does not generally derange the stomach at all, which cannot be said of gallic acid or of lead. Of the infusion of matico, not less than two ounces should be taken every three or four hours if bleeding is considerable. Preparations of ergot, the tincture of hamamelis, Ruspini's styptic, as well as other agents, have been vaunted on the strength of assumed successful results in some instances. My own experience is that no internal remedy can be relied on to check hæmorrhage from a vesical tumour. Attacks of bleeding always cease spontaneously sooner or later, and the medicine swallowed at the time obtains the credit of possessing power as a styptic. Hence the reputation, such as it is, which these agents have attained.

For the local treatment of vesical hæmorrhage, when it is chronic and constant, I know of nothing so good as injections into the bladder of nitrate of silver, commencing with one grain to four ounces of distilled water, most gently and carefully used; for it is almost unnecessary to state that by such local treatment, if your handling is rough, it is very easy to increase the bleeding. You may throw in an injection daily, in the manner before described (page 374), permitting an ounce to remain when the catheter is withdrawn: and the quantity may be augmented gradually as far as to one grain to the ounce, provided that undue pain is not caused. Few can bear this quantity without considerable uneasiness, and this sign of its action should, I think, be reached if the bleeding remains still unchecked. When hæmorrhage is considerable, absolute rest in bed, cold applications, and avoidance of instrumental interference, unless absolute retention renders it necessary, are the main additional elements of treatment. If instruments are really necessary to withdraw blood and urine, then the slow injection of iced water, or, better still, of iced infusion of matico, may be useful. A solution of the tincture

of the perchloride of iron as a cold injection I have known in more than one case to succeed when all others have failed. The proportion is from thirty minims to two drachms or even more of the tincture to four ounces of water.

For alleviation of pain or frequency of micturition do not spare opiates—trying any form, or all forms in turn, until you find that which most assuages it and least disturbs the digestive organs. Give them by mouth, subcutaneously, or by suppository. Never mind how much, in order to act efficiently. When irremovable tumour is present, it is not a question of saving life, but a question of mitigating that most frightful of human miseries—prolonged, continuous, severe bodily suffering; and this for a patient whose doom is certain, and to whom life has come to be for the most part a dire calamity. While you are bound, therefore, on the one hand jealously to guard life, I hold that you are equally responsible, on the other, that it shall be rendered fairly endurable. I confess that I have felt sometimes almost indignant at the sight of a poor fellow-creature, worn out with anguish, praying for death, who, thanks to a well-meaning but weak timidity, is permitted only such small comfort as fifteen or twenty minims of liquor opii, or of a solution of morphia, once or twice in the twenty-four hours, can afford.

For the relief of chronic retention of urine, such catheterism must be applied as the case requires, whether periodically or continuously, as the comfort and the exigencies of the patient render desirable.

I now gladly come to the consideration of operative measures for the extirpation—I may add, the cure—of some vesical tumours. And this is a subject which I approach to-day with widely differing convictions from those which I, or any of us, ventured to hold respecting it only eight years ago. For now and then, as in some instances already alluded to, the presence of an example has been recognised, both in males and females, where the tumour has been sought in the bladder by an incision, and has been removed with complete success. But, with such few and almost accidental exceptions, nothing has been done to remove by surgical operation these morbid growths; and no systematic procedure has been adopted to effect either their exact diagnosis or cure.

But during the last eight years I have more carefully sought evidence of the presence of vesical tumour, and have found it more common than I formerly suspected. The consequence is, that I have had the opportunity of operating on no less than forty-one cases, and of these I will briefly give you the result, as the best means of conveying information on a subject of which so little is known. I need scarcely say how important it is to discover the existence of this form of disease, and that in an early stage, inasmuch as certain death awaits the patient who is the subject of it, unless the growth be removed.

I shall commence by briefly relating my first case. It occurred in November 1880. A man, aged 29, from whom I had removed a small calculus, oxalate and phosphate, in the spring by lithotripsy at one sitting, was still the subject of symptoms which did not disappear, but rather gradually increased. I crushed a phosphatic concretion for him subsequently, and then found within the blades of my lithotrite a mass which I could neither crush nor remove, and which suggested to my mind the presence of a partially encysted calculus. Accordingly I advised him to permit me to make an opening into the deep urethra by a median incision in the perineum for the purpose of ascertaining precisely what was the state of matters. Having thus introduced my finger into the neck of the bladder, and desired my friend Mr. Buckston Browne, who assisted me, to make firm suprapubic pressure, I soon detected a tumour of polypoid form coming down from the top of the bladder, apparently about the size of a large filbert, coated with calculous matter. I then introduced a small lithotomy forceps, and twisting the mass with great caution, separated the attachment and brought it away entire without difficulty. The calculous coating of the tumour felt by me when grasping it with the lithotrite, together with its slight mobility, had doubtless given rise to the suspicion that there was a stone more or less fixed in the bladder. The man had not a bad symptom, made a speedy recovery, and is in perfect health at this moment, as you may see, for I have brought him before you in this theatre to-day.

It was the issue of this case which led me to adopt the proceeding systematically, as a mode of prosecuting the dia-

gnosis of obscure disease; and this was in fact my first case of 'digital exploration of the bladder.'

Let us now consider what is the best course to follow in regard of operation, where there is reason to believe that a patient has a vesical tumour not manifestly cancerous in character. For if it be so, be assured that any attempt to remove it entirely must be unsuccessful, will probably be injurious to the patient, and is therefore not to be made.

Two distinct classes of cases are met with; the larger class consists of those patients in whose urine the débris of papillomatous growth are found, and which can be identified as such by the microscope. About these cases there is no doubt as to the presence of the growth. The only question is 'What is the best manner of dealing with them?'

The second class consists of those cases in which the history and the symptoms, especially the nature and extent of the bleeding, render the presence of tumour highly probable. Nevertheless, after several examinations, no papillomatous or suspicious cell-growth has been discovered in the urine.

For these cases digital exploration should almost always be performed. This done, the operator ascertains if a growth be absent or present: and if the latter, whether it be a single polypoid growth which may be easily removed by the forceps—or whether its extent and physical characters indicate that a better chance of removal will probably be obtained by performing the suprapubic operation. Or, the inquiry may lead to the decision that the growth implicates the coats of the bladder chiefly, that it is not developed in the form of prominent masses admitting of removal, and therefore that no further operative procedure is desirable. Then it may be laid down that digital exploration should be employed for all cases in women, because it consists in merely dilating the urethra, and an exact diagnosis is easily made. And in any case, when this is obtained, if the surgeon prefers to operate above the pubes, there need be no delay, but he should proceed forthwith. The perineal incision does not in the least degree interfere with the subsequent proceeding; the rectum is to be distended in the usual way, and the bladder will retain the necessary injection, which is the next step of the process, notwithstanding the opening which has just been made.

Should the management of the cases constituting the first class differ from that just sketched? I refer to the cases in which microscopic examination has demonstrated that tumour is present. Is an exploratory incision necessary or desirable also for them?

In the majority of cases perhaps it is not. It is quite true that when there is only a small polypus with a narrow neck, it can be easily removed by a simple perineal incision; and I am bound to state that my most successful cases have been thus treated and have been permanently cured in that manner. But they would have been successfully treated also by the suprapubic method; which moreover offers an additional advantage, in the fact that, especially when the patient is not stout, the operation affords an opportunity of removing other minor growths, if such exist, more easily and effectually than the perineal opening does. When I first began to remove vesical tumours, the value of the suprapubic procedure, in regard of simplicity, safety, and efficiency, had not been established. But an enlarged experience of it, not merely that of other surgeons, but in my own hands, has convinced me that it offers advantages when the tumours are multiple or considerable, not to be obtained by the perineal route. I cannot recommend that it should be performed when you merely entertain a suspicion, however strong, that tumour is present in any given case. As long as the absolute proof arising from fragments passed in the urine is absent, the perineal exploration is the only legitimate proceeding, unless it is deemed better to devote a longer period to the research for such indubitable evidence.

Next, as regards the removal of tumour through a perineal opening, whether in the male or female, I have nothing to add to the details which I fully described in my last lecture, when dealing with the exploratory operation, that is to say, relative to the method of removing any foreign bodies or detaching any morbid products which had been thus discovered.

Again, when the suprapubic operation is to be undertaken for the treatment of vesical tumour, no different mode of performing it from that required for the extraction of calculus has to be adopted. Hence the operation is to be performed in the manner already described in every particular as far as

to the opening of the bladder. And at this point of the procedure I now take up the further instructions for completing it.

I request you to imagine, then, that there is a patient here before us, whose bladder I have just opened above the pubes, and that my right index finger has entered the small aperture as the water was flowing out in a full stream. My left hand may still be holding the handle of the hook which was firmly engaged in the vesical coats before I made the incision, and it is now therefore in the condition of being removed. Of course the finger is engaged in carefully surveying the form, the dimensions, the consistence of the tumour, and especially the nature of its attachment to the walls of the bladder, whether by a narrow or by a broad base. Then the whole of the inner surface of the cavity, usually smooth and polished, is traversed in the search for other growths only exceptionally present. And when the space required for action has been thus determined, the opening, at present only small, may be enlarged by distending with the finger or by cutting, to the size deemed necessary for affording room to act, and, if necessary, light to see. It is usual, often convenient, to pass a long loop of stout silk, one on each side of the upper margin of the opening of the bladder, through its coats, that an assistant may by drawing them apart display the cavity, and at all events preserve the opening in its place. Or this may be done by well-curved retractors. The operator then applies the forceps already described, blunt or sharp according to the nature of the tissues to be removed, using the latter kind only when it is not possible to remove them with the blunt instruments. By careful management all the free growth is taken away; and if a thick or hardened base is encountered it must be left: there can be no attempt to separate this from the tissues beneath, since it is incorporated with the wall of the bladder, and any ablation of this would be fatal. When the growth has a narrow, more or less, pedunculated connection with the vesical coats, it is cut off pretty close to the adjacent surface. At last, when nothing remains to be dealt with, the fluid should be allowed to run out of the rectal bag, for the bleeding is usually rather free during the process of detaching the growth, and removal of pressure on the veins caused by the distended rectal bag materially checks it. There is no occasion to close the bladder.

Its muscular tissues soon contract and narrow the opening, which may moreover continue to give exit to a quantity of small tumour-débris which remains, and some of which will slowly slough and separate. The wound is then treated precisely as after the suprapubic operation for calculus, the directions for which were given in detail in the lecture on that subject.

I shall now briefly give you my view of the general results of my experience of removing vesical tumour to the present date.

I have operated altogether on 41 patients, 34 male and 7 female. Excluding of course the recent cases, say the last twelve, since the lapse of a considerable period of time is necessary to determine the question, in at least five patients the cure has been complete: no return has taken place, and the patients, with one exception of a man since killed by accident, are as well at this moment as they ever were, and are perfectly free from any urinary symptom. The victim of the accident had passed nearly two years after the operation, without return of symptoms. An autopsy was made by the medical man who sent him to me and was interested in the result. He was good enough to send me the bladder in order to prove that there was no sign of re-appearance: indeed a careful scrutiny was necessary in order to discover some slight traces marking the site of the operation. The growth and the bladder also are at University College Hospital.¹

A large proportion obtained relief from severe symptoms for different periods varying between two and four years, and then re-appearance of the growth has led to a second operation. In two cases, one that of a medical man who fully understood the pathology of his terrible disease, I have operated three times; in both of these, at the desire of the patient from experience of relief and reprieve attained by their preceding experience.

Four patients died within a few days of the operation; partly from exhaustion, two from cystitis and peritonitis, all among the very early cases, probably from too great an anxiety on my part to remove the whole of the growth, and the want of the safer and more efficient instruments which experience has led me now to employ. Two died from blood-

¹ This case is given in my work on Tumours, in which it is No. 20.

poisoning each on the twelfth day after operation, one after the perineal incision, and the other after the removal of a large tumour by the suprapubic route. Several are living with threatening return; the great majority gaining relief from severe symptoms and some extension of life, varying considerably in different instances.

We have to remember that every patient with bleeding vesical tumour inevitably succumbs sooner or later to his fate, unless surgical aid is afforded. Every case therefore of permanent cure is a life absolutely saved by our art; while prolongation of life, whatever it may amount to, is equally so. Hence these results, although necessarily showing many failures to remove the disease, manifest a considerable aggregate of clear gain in the matter of human life, and must be so regarded in relation to the sum total of those who are afflicted.

For any given individual case, the result of operation cannot be predicated, and must always more or less present the uncertainty of a lottery. Until the knife has revealed the physical characters of the tumour, no one can say whether it be possible to remove it completely, and unless separation is complete there is little chance of a permanent cure.

But apart from the chance so offered, there is only the certainty of a fatal result; hence the operation must be advised if the patient's condition is not clearly unfavourable, coupled with the statement that a perfect result cannot be ensured.

A few outlines of cases are appended, with diagrammatic representations of the tumour, each copied from the sketch I always make after the operation, of my idea of the size, and relations of the growth to the bladder, as obtained by careful exploration with the finger before commencing the removal.

CASE A.—I have already given a summary of this my first case at page 405, a man aged 29. The operation was performed in November 1880, and the diagram of the tumour is annexed here. (See fig. 110.)

CASE B.—A lady aged 30, from whom in the spring of 1882 I removed a large mass of villous tumour, after dilating the urethra so as to admit my finger and the forceps. She

had suffered severely for five or six years. It arose from one rather broad peduncle at the back of the bladder above the trigone, and formed a tripartite head. The whole was separated by means of the forceps, and she made an excellent



FIG. 110.—Diagram of form and situation of tumour in the bladder. (Case A.)

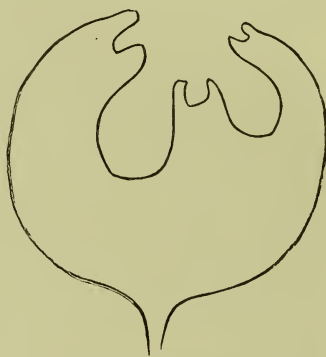


FIG. 111.—Diagram of form and situation of tumour in the bladder. (Case B.)

recovery. (See fig. 111.) The tumour is in the College Museum. About a year afterwards I removed a small growth close to the neck of the bladder, which had probably escaped me before.

In the spring of 1886 she came up again with a considerable tumour nearly filling the bladder, and it was agreed that I should remove it by the high operation. Everything was arranged for it, but immediately before administering the ether she declined to submit to this operation, and begged me to make the attempt in the same manner as before. I reluctantly consented, took away some large portions; the bleeding was very free, indeed uncontrollable, and she gradually sank on the third day. She had lived four years after the first operation.

CASE C.—A medical man, aged 52, had suffered from hæmaturia about five years, with long intervals of freedom, particularly after the injection of perchloride of iron. In November 1882, he reported a severe bleeding in July, uncontrollable and more or less continuous since, with painful and frequent micturition, loss of strength, &c. On November 20,

I operated by perineal incision, in the presence of Dr. George Johnson and Mr. Erichsen, finding a considerable polypoid growth springing from the left side of the bladder. (Fig. 112.) This I removed with the lateral curved forceps. Bleeding was rather free for thirty-six hours; no pain. He made a steady recovery, and left town perfectly well in a month's time. Urine healthy, retained five hours.

January 23, 1883.—Has recently seen a trace of blood after a seven-mile walk, which he felt was too much for him.

In June, symptoms having reappeared, I opened the urethra as before, in presence of Dr. George Johnson, and found springing from the old site a growth which I removed in the same way. Recovery rapid, and great relief.

February 1884.—Symptoms have recently reappeared, and he requests me again to operate, which I did as before. Dr. George Johnson and others present. We were surprised at the quantity of growth removed, so short a time having elapsed since the previous operation. The bladder was again left clear of any protuberant masses.

Early in the summer, bleeding returned and soon became severe; the pain also had been of late almost unbearable, and morphia was taken in considerable quantity. He earnestly begged me to afford him relief by again opening up the old track, and I consented, finding much soft growth and removing it, after which he expressed his satisfaction with the relief afforded. He died within ten days after this of exhaustion. At the autopsy the base of the growth implicated the left side and top of the bladder, and on that side the ureter was largely dilated, the pelvis and kidney forming a largely distended sac holding 12 ozs. of opaque urine, the kidney-tissue proper having nearly disappeared. Right kidney and ureter natural size, amylaceous degeneration of former. He lived less than two years after the first operation.

CASE D.—J. H. B., aged 40. He consulted me first, June 7,

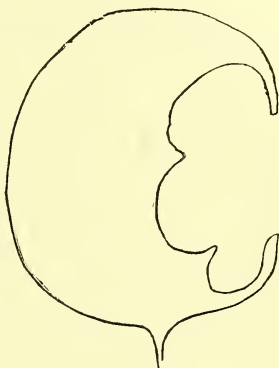


FIG. 112.—Diagram of form and situation of tumour in the bladder. (Case C.)

1883. Had seen blood in the urine three years before. Of late it recurred frequently and in large quantity. No undue frequency of micturition; not much pain. He is very feeble and extremely pallid; no débris found by washing out the bladder.

July 7.—Digital exploration, Professor Holmer of Copenhagen present. Finding a large polypoid growth with base as



FIG. 113.—Diagram of tumour.
(Case D.)

wide as the body of the growth, I removed it entire with the straight blunt forceps, at two applications. He made a rapid recovery, and in three weeks left for Rochester, where he was assistant to a medical man. Finding himself soon after much stronger, and all bleeding having long ceased, he went to practise as a dentist at Sheerness, and I heard no more of him for nearly three years, when he wrote me that he had remained quite well for two years; then slight bleeding re-appeared. Six months later he reported himself better, but in June 1887, four years after the operation, he called on me in low health, evidently the subject of tumour as before, recently increasing fast. I advised the suprapubic operation, and he took time to consider. He came again in October, and the result of our conference was that he was to have a private ward in University College Hospital, and that my friend Mr. Christopher Heath should do the operation there for him. I was present, Mr. Heath removing a large mass of the same growth as before by the suprapubic route. Everything went well and appeared to promise a successful result. A few days after he died rather suddenly. The autopsy showed distended ureters and pelvis of the kidneys, with not much renal structure remaining. The growth was fibro-papilloma on each occasion. He had lived more than four years after the operation.

CASE E.—T. S., aged 42. May 13, 1881. He has suffered with attacks of hæmaturia about six years, with long intervals without seeing any blood. Now he has a little undue frequency of passing urine and a little pain. On October 30, 1883, he

consulted me again. Bleeding increasing by degrees; I washed out much columnar epithelium in masses; micturition more frequent; passes small phosphatic concretions. Sounded a 'softish' feel, the sound not turning quite so easily as in the healthy bladder, but no obvious resistance can be recognised at any spot.

November 16, 1883.—Digital exploration. Mr. Jones of Sydney, Dr. Steven of Harrow, present. Found a large tumour, cauliflower-like in form, but with broadish base; removed it without difficulty, leaving a rather firm portion slightly projecting, from which it arose, and which I dared not further interfere with; the structure was externally papilloma, but near the origin from the bladder, 'denser, much connective tissue with muscular fibres, and some suspicious cells therein' (Dr. Gibbes).

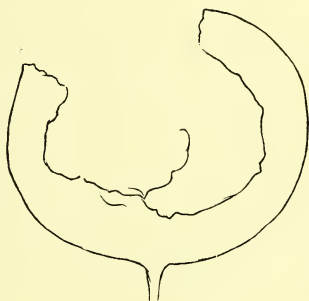


FIG. 114.—Diagram of tumour.
(Case E.)

December 5.—The wound had healed. 15: Has walked several times; no bleeding or other symptom, and will now return to the country, in Cheshire where he lives.

January 23, 1885.—He called on me; has actively followed his occupation, that of land agent and surveyor. Once only saw a little blood in the urine. Has gained weight and strength.

1886.—In the autumn he married: enjoying excellent health: but soon after his old symptoms appeared, although not severely.

June 25, 1887.—He and his wife came up to see me. His general health good, and he has gained in weight, but his strength diminishes: and the bleeding is considerable. Question of fresh operation discussed, and no conclusion respecting it accepted for the present. If anything is feasible, it is the suprapubic operation. I received intelligence of his death in the following September. He lived nearly four years after operation.

CASE F.—R. S. R., aged 63. First seen May 27, 1884. He had seen blood in the urine for first time above a year before: then occasional attacks becoming more frequent. Micturition

not frequent; very little pain. The stream, commencing pale in colour, often ends with a bright red tint. Found a fragment of papilloma by using a small aspirator to wash the bladder. Was sent to me by Mr. J. L. Crisp, of South Shields.

May 30.—Perineal operation: Drs. Pinter, Charamis, and Shippen present. Removed a semipedunculated tumour from



FIG. 115.—Diagram of tumour.
(Case F.)

right side of the bladder effectually by lateral cutting forceps, the structure being rather firm. It proved to be chiefly made up of normal tissues of the bladder with papilloma on the surface. He had a slow convalescence, prolonged by severe orchitis ending in abscess of the testicle. He returned home in seven weeks free from symptoms. A year afterwards I received a letter expressing himself delighted with the result: there was no symptom of any disease in his bladder.

In July 1886, Mr. Crisp wrote to me that the patient had died after a severe accident; that he had made an autopsy, examined the bladder, and that 'there was not the slightest sign of any return of the growth there, but that the cicatrix was very distinct.' Mr. Crisp was kind enough to forward to me the bladder some time after, and it was then difficult to trace the site of the operation. I sent it with the original growth removed to be placed in the museum at University College (Nos. 1471 N, and 1471 NN).

CASE G.—H. J. B., aged 54. Dec. 6, 1886. First seen, with Dr. Boyd of Wandsworth. Blood first seen eight years ago; only of late frequently recurring after exercise. Washing out the bladder was followed by a free flow of florid blood, and in the eye of the catheter was a soft, semi-gelatinous mass, which under the microscope proved to be a fine specimen of papilloma. By rectum, the bladder seemed somewhat distended, although empty of urine. I proposed the high operation, and did it on December 8, Mr. H. Morris of the Middlesex and Dr. Stein of New York present. I found a large pedunculated growth closely resembling that of case E, and

removed it close to its connection with the bladder. He made a speedy recovery. On the 27th inst. he called on me, wound nearly closed: no urine had passed by it for four days. A week later he left in good health, holding his water six hours and having walked two miles. The growth was simple papilloma: and is at the museum of University College.

A year after I heard from him that he had long been occupied with his usual avocations and had seen no sign of re-appearance of his complaint.

LECTURE XXXI.

ON HÆMATURIA AND RENAL CALCULUS, AND THE OPERATIONS
FOR REMOVING IT.

GENTLEMEN,—I propose to-day to complete the programme I originally designed for this course by considering a phenomenon of common occurrence known as Hæmaturia.

Let us define the term. What is hæmaturia? The out-flow of urine containing blood in admixture. Thus bleeding from the penis at other times than that of micturition is of course not hæmaturia. Bleeding coincident with micturition from chordee or operation, or from any known injury in the course of the urethra, is also not to be included in the meaning of the term. The blood in these circumstances usually issues by the side of the stream of urine, and is only partially mixed at its line of contact, or it may follow rather than accompany the urine.

Hæmaturia, then, is a symptom. Its presence is, in all cases of urinary disease, to be sought. Hence the inquiry forms one question—the fifth—of the necessary six which I instructed you always to ask in forming a diagnosis. Here is a glass of urine, evidently containing an admixture of blood. What is the source of it? Now, it is often not an easy thing to state at once what point of that long and complicated organic apparatus, which commences in the Malpighian corpuscles and ends at the external meatus, is the source of the blood in question. Sometimes it is exceedingly difficult to define its source. Thus it is that in medicine you will often find some symptom, the pathological cause of which is not very obvious, getting a specific name, and coming at length to be erroneously regarded as a distinct disease; and just as you will be asked, as I told you the other day, what is good

treatment for dropsy, you may also be asked what is good treatment for hæmaturia.

Now, the consideration of this question, besides affording us new material for inquiry, will bring us again upon ground we have already travelled over together. I don't regret that—for your sakes I mean. It will stand in the same relation to the past as the arithmetical 'proof' does to the already worked sum. It is in some respect a synthetical operation following an analytical one. When, therefore, you see a specimen of urine containing blood, you will, as a matter of course, make a rough mental note of the proportion of blood present, and you will mark the colour. And as you can count on your fingers the ordinary sources of blood, these will pass rapidly in review at the same time. Let us name them as follows:—

1. The kidneys; where hæmaturia may arise from diseased action more or less temporary, as inflammation; or from disease more or less persisting, as degeneration of structure, as in Bright's disease and in tubercle; or from mechanical injury, as by calculus there, and in abscess; or by a strain or from a blow on the back. If the hæmaturia is the result of inflammation, there will be general fever denoting its presence; if produced by slow organic change, there will be the history of failing health, and probably urine changed in quality otherwise than by the mere admixture of blood. When blood is intimately mixed in very small quantity, as it is sometimes, note the characters of the urine proper—it may be of low specific gravity, pale, with albumen in greater proportion than blood or pus will account for; perhaps renal casts may be found—and inquire for the existence of dropsies in any form or degree. In the preceding conditions described, if blood is present, it will give a smoky tint to the secretion. Perhaps it may be affirmed that the blood in such urine, associated with little local pain, is more likely to come from the kidney than elsewhere. In renal tumours of a malignant nature, blood may be large in quantity at times; the rapidity of growth and considerable size attained are the marked characteristics of the disease. If mechanical injury be the origin of hæmaturia, there will be the history of a blow or strain;

or there may be the signs and symptoms of renal calculus, of which more detail presently.

2. Then, putting aside the ureters, you will remember the bladder as the second source of hæmorrhage; and here it may be due to severe cystitis, calculus, or tumour. The first is obvious enough from muco-pus in the urine, and other signs; while the second may well be suspected by the symptoms, and its presence realised by the sound. Here the hæmorrhage is mostly very small in quantity but usually florid, and in proportion to the patient's movements. But the third condition—namely, that the hæmorrhage arises from tumour—is not always so readily to be affirmed. As a rule, however, blood from such a source is very much larger in quantity than from stone, and may be associated with less of muco-pus. If the tumour is malignant, it may be felt by rectal or suprapubic examination, and the pain is often severe; if it is a variety of papilloma, the most frequently occurring among these growths, the urine has often a pale dull red tint for days together; and in both cases the blood is florid, unless it is long retained in the bladder, when dark sanies, like coffee-grounds, results. Then it happens, from time to time, that pure urine issues during the former half, or more, of the act of micturition, becoming coloured by blood during the latter part, and finishing of a deep red colour. This is highly significant that at all events the source of the bleeding is vesical; if there is little pain, not much undue frequency, and the bleeding occurs in severe attacks with intervals of freedom from it, papilloma is likely to be the cause.

3. In hæmorrhage from the prostate, the third principal locality or source, a deep dark tint is often observed, if the organ is hypertrophied and the blood is retained; but here the age of the patient, the history of gradually increasing trouble, associated with difficult catheterism perhaps, and the ascertained condition of the organ from the bowel, aid the diagnosis. A slight appearance of blood mixed with the last few drops of urine is not a rare occurrence in chronic prostatitis; this of course in younger subjects.

4. When bleeding arises from stricture of the urethra, the patient's history and the cause of the bleeding, almost always following the use of instruments, leave no room for doubt.

From the use of instruments also in the bladder, hæmorrhage sometimes arises.

5. Lastly, it is not to be forgotten that occasionally an addition of blood to the urine may be caused by the action of violent diuretics, by purpura, fevers ; by the presence of a parasite well known in hot countries and occasionally brought here, the *Bilharzia Hæmatobia* ; by slight accident in subjects who manifest distinctly the hæmorrhagic diathesis, and very rarely as the vicarious supplement of a menstrual discharge.

Now for the treatment of hæmorrhage. When you have determined that its source is above the bladder—that is, in the kidney or in its pelvis—probably the first and most influential remedial agent is rest in the recumbent position. Whether from a lesion affecting the intimate structure, or from the mechanical irritation of a calculus in any part of the organ, rest is the first and the essential condition. The patient is, moreover, to be maintained in as cool and tranquil a state as possible.

It is in renal more than in any other form of hæmaturia, perhaps, that direct or internal astringents or styptics are useful. I shall do no more than name those which are most commonly used—namely, alum, gallic and tannic acids, lead, and turpentine ; equal to them is, I think, the infusion of matico, say in doses of two ounces every two or three hours. The tincture of the perchloride of iron, and also sulphuric acid, may sometimes be taken with advantage. Besides these the preparations of ergot and the tincture of hamamelis are not to be overlooked.

It is, however, in cases of severe hæmorrhage from the bladder, or more commonly from an enlarged prostate, that an active and judicious treatment is necessary. You will be called sometimes to a patient whose bladder is distended with coagulated blood, or who is passing frequently a quantity of fluid in which blood is the predominating element. Usually this has arisen from some injury inflicted by the instrument, although it may also be from tumour of the vesical walls. Here you will keep the patient on his back, and forbid the upright position, or any straining, so far as you can prevent it, in passing water. To this end give opium liberally, to subdue the painful and continued action of the bladder. It

has always been the rule of practice to apply cold by means of bags of ice to the perineum and above the pubes: it is more to the purpose to introduce small pieces of ice into the rectum. But I doubt very much the value of ice applications, externally, for vesical hæmorrhage. One thing is quite certain, that the cold has no penetrating power from the surface to that organ: and that the ice does not abstract a single particle of caloric therefrom. A thermometer in the bladder is not lowered a single degree by all the ice-bags you can apply. Whether it is of value by any indirect agency is another question; perhaps the spine would be a better locality if ice is to be used at all. When bleeding is severe, do not use an instrument if it is possible to do without it. There appears to be a great dread, and, as I think, a wholly unnecessary one, in the minds of some medical men, of the dangers supposed to attend the presence of a large coagulum in the bladder. I have even known a bladder to be opened above the pubes by the surgeon, for the mere purpose of evacuating a mass of clotted blood. Leave it alone: it will gradually be dissolved and got rid of by the continued action of the urine; while if you are in haste to interfere with instruments, and are very successful in removing it, you will very probably also succeed in setting up fresh hæmorrhage. The bleeding vessels have a far better chance of closing effectually if they are not subjected to mechanical interference. Meanwhile support the patient's powers by good broths, or any nutritious food he can most easily digest.

But it sometimes happens that hæmorrhage occurs in a patient who has long lost all power of passing urine except by catheter. This is a very different position. Here the coagulated mass which fills the bladder must sometimes be removed, or no urine can be brought away; none issuing even if a catheter is passed, for the end of the instrument enters a mass of dense coagulum, and nothing escapes. Sometimes a portion of semi-liquid clot can be removed by attaching to a large silver catheter a six-ounce syringe or a stomach-pump. The lithotritry aspirator has answered remarkably well with me in two or three instances. There are circumstances, doubtless of rare occurrence, in which even these means fail, and in which life has been saved by applying the act of suction to the end

of a large silver catheter and withdrawing the first portions of the clot thus, after which the aspirator becomes efficient for the rest.

In bleedings of this kind, let me caution you not to inject, as a rule, strong solutions of styptics, especially in considerable quantity, into the bladder; the irritation so produced generally does more harm than good. There are some few exceptions, but the injection of a powerful styptic into the bladder often produces painful spasm, a condition in which hæmorrhage is more commonly increased than diminished.

In passing to another subject, I beg to call your attention to a glass before you containing some urine of a dark and somewhat unnatural tint. In obtaining this specimen I took care that the patient, a man of middle age, should first pass about an ounce into a separate vessel, to clear his urethra—a precaution always absolutely necessary to avoid error, as I have before warned you—and the remainder of his urine into this. It is less translucent than average healthy urine is, and has a deeper colour. The hue is not red, perhaps slightly orange, but associated with a characteristic dirty grey-brownish tint, commonly and very well distinguished by the word 'smoky.' That tint denotes blood to an ordinarily practised eye. Why is it not red? Because blood, after a certain term of contact with urine, loses its red colour and becomes brown; and you see it in that condition, according to the proportion present, producing any depth of hue from this up to that of London porter. Put it under the microscope, and you will find abundance of blood-corpuscles. We get this broad principle, then, to start with: bleeding from the more distant parts of the urinary system, unless in very large quantity, will almost certainly make the urine brown; while urine which contains red blood has almost certainly issued from some source in the bladder, probably at or near its neck, this being the most common site of vesical hæmaturia.

In the case before us, then, we proceed easily and rapidly to eliminate many of the sources of bleeding, by the account which the patient gives of his sensations, and subsequently by physical examination of some kind. His age is forty-five years. He makes a good stream when a fair amount of urine has accumulated in his bladder, less so at other times when,

as sometimes happens, he has to pass it every two hours, or less, being usually not so frequent at night; no straining is necessary for the purpose of emptying the bladder. Pain in the course of the urethra may or may not be experienced during and after micturition, but not severe. He is uneasy about the loins, chiefly on the left side, on taking exercise, and more blood passes afterwards. He is not necessarily emaciated, but if he is affords a good condition for examination by the hand. He is subject to variation in the intensity of the symptoms, having now and then an attack for a single day, or of a few days' duration, in which they are aggravated, and especially the left renal pain, which is sometimes very severe, for some hours, and attended by sickness or nausea. He dates their commencement from an attack which occurred seven years ago, which was accompanied by vomiting and acute paroxysms of pain lasting for six hours, which came on without notice and disappeared almost as suddenly. After this the urine was very dark for a day or so. He states that he has never passed gravel. He is less robust than formerly; his digestion is often not good. A full-sized bougie passes easily into the bladder; no stricture; hypertrophy of prostate at his age is not possible. On sounding he is somewhat more tender than usual; nothing is found in the bladder, nor is any deviation from the natural condition felt by simultaneous examination in the rectum. Palpation of lower part of abdomen shows nothing. Arriving close under the last ribs of left side with one hand, the other pressing firmly from the front on left renal region, he flinches unmistakably; that is the spot, he says, where he feels pain at times and on movement; on right side, nothing observable. We examine his urine: sp.gr. 1.018, acid, small brownish deposit on standing: under microscope blood-corpuscles, some pus-corpuscles, epithelium, no crystals, no casts; albumen, a little, but only corresponding with organic matters present.

What is the seat of the lesion in his case? You say, perhaps, the bladder: we found it tender to the sound, and it acts with undue frequency. Yet remember this is by no means sufficient evidence of any primary morbid change there, this symptom constantly accompanying diseases affecting primarily the kidneys or the upper part of the ureter

while the bladder is healthy. Much more probably the kidney. The history, the manifest local tenderness, the repeated attacks of pain there accompanied by nausea, the impaired health, the absence of all the more common causes of cystitis in any form, point to the left kidney as the seat of mischief. The absence of albumen and renal casts—a fact of not much weight, although their presence is of the utmost importance—leads us to believe him free from organic changes affecting the renal structure. On the whole the evidence is tolerably strong in favour of the conclusion that his left kidney is the seat of calculus, although he has never passed one, and has at present no crystalline deposit in his urine—a fact by no means essential to the diagnosis; and it is probable that a renal calculus is the cause of the blood and pus found in his urine.

Before I enter on the treatment of the case just sketched, which may be regarded as a typical one of renal calculus, let me warn you against too readily assuming that cases which very closely resemble this are necessarily the subject of calculus-formation. According to my experience a very large proportion of the patients adjudged on the presence of such symptoms, or very nearly such, to be the subjects of calculus, are not so.

It is by no means uncommon to have a history of attacks of severe pain in the region described and vomiting, followed by highly coloured urine, generally of a deep orange, loaded with urates, and sometimes containing a little blood, occurring every few weeks, or two or three months, for a year or two, or more, and yet no calculus is produced. The points which distinguish the patient just examined from these are the persistency of the tenderness, always precisely in the same situation, a very important fact; and the constancy or frequency of the blood deposit aggravated by exercise. Without such significant signs, the attacks now referred to are simply periodic discharges of superabundant uric acid from the system, and may be termed gouty if you please and prefer that term. They are undoubtedly associated with imperfect action of the liver, or rather are produced by the daily use of a diet too nutritious and stimulating for the habits and expenditure of the individual; and thus it is that appropriate treatment by diet, and elimination of secretions by

way of the intestines, almost infallibly ensures the gradual disappearance of the attacks. This subject is identical with that discussed at length in Lectures XXIV. and XXV., but could not be altogether passed over here. For I desire you especially to be impressed with the fact that a very great majority of the severe attacks of nephralgia or renal colic, so called, belong to the category described, and are not calculous. Periodical elimination of uric acid in the crystalline form, affording temporary relief to the system, may, if long neglected, no doubt ultimately give rise to the formation of calculus. There are a few examples in which the expulsion of pisiform uric-acid calculi takes place at the first attack or may occur without any renal symptoms at all, but they are of a nature very different from the cases now under consideration, and are far less common, and are somewhat less amenable to treatment.

To return to the example before us. It is sometimes not easy to say what kind of calculus exists in these cases, of which this man's is a fair type. When any calculous matters have been passed which can be examined, or when the crystalline deposit in the urine is constant, the inference is pretty clear. Add to this that the probability in any case is strong in favour of uric acid, from its known frequency of occurrence—taking large numbers, say at least fifteen to one as compared with oxalate of lime.

For treatment: Alkaline diuretics and diuretic vegetable infusions, before named, for a period of time; attention to the digestive functions and to that of the skin, for the kidneys are probably working too much vicariously for some other function acting insufficiently; some mild form of counter-irritation over the renal region, moderation in highly nitrogenised food and also in all fatty compounds, a large proportion may be advantageously fish and vegetable; very little alcoholic drink if any; in most cases none should be permitted. Of all medicinal remedies, perhaps none are so valuable as mineral waters, especially those which have sulphate of soda, largely diluted, as the main ingredient. For two well-known remedial agents, which are very popular, each among its class, I am bound to tell you I have very small esteem. Here in town it seems to me that every man

advises his neighbour, and on every pretext, to drink Vichy or some other popular water, but always one that has been rendered so by dint of advertising—advice which is cheap, and of which the value in most instances by no means exceeds the cost. In the country, where perhaps the fair sex more usually dispense similar aid to their suffering neighbours, the prescription used formerly to be mostly gin and water, a practice however which is slowly becoming obsolete. More recently, I regret to observe that, even among our own profession, the recommending of whisky has become a fashion. As for the well-known mineral water first named, which is a strong solution of carbonate of soda, I must say that, if not absolutely injurious, it is at least greatly inferior to potash. In regard of the two alcoholic agents, it is impossible to say more, or indeed less, than that they are about as serviceable to the kidneys as a pair of spurs to a jaded horse—making him travel for a time, but taking it out of him in the long run. The subject has, however, been treated at length in the lectures already named.

For the paroxysms of severe pain which denote the passage of a renal calculus, you will find hot hip-baths, prolonged or often repeated, of the greatest service ; the temperature may be increased to anything the patient can bear. The application of a hot linseed poultice, the surface of which has been sprinkled with strong flour of mustard, an excellent rubefacient at all times for this region, may intervene, or be substituted for the bath. Indeed the suffering is sometimes so severe that movement even to a hip-bath is felt to be impossible, and local fomentation or other method of applying heat must supply its place. But a subcutaneous injection of morphia is then the best resource, and should not be delayed ; at the same time the patient should be allowed abundance of barley-water, potash-water, or the like, for drink.

After the severe attack has subsided, it not uncommonly happens that more or less pain continues in a chronic form, not acute but dull, wearying, liable to be increased by movements, especially those of travelling.

And thus the patient's activity becomes so impaired as to interfere greatly with the necessary occupations of life. He is disqualified for pursuing his labour, whether physical or

mental, and until late years it must be confessed that no alternative but that of waiting, with such patience as he could, has been afforded him.

Happily however, during late years, much has been done in the way of exploring, cutting down upon, and removing impacted renal calculus from its seat in the kidney, or in the pelvis, as the case might be. Moreover, the simple operation of making an incision down to the kidney, and removing a small stone, is not necessarily a dangerous one; while there are cases on record in which, although no stone has been found, much relief has followed the incisions made.

The operations of nephrotomy, nephrolithotomy, and of nephrectomy are different forms of procedure by which renal calculi (as well as tumours) have been removed. I will briefly advise you as to what experience has taught us in relation to this important subject.

When in a patient of either sex, or at any age, there is reasonable ground for the belief that renal calculus has existed for some time and is the cause of much and persistent suffering, an exploration should be made in the situation for the performance of lumbar colotomy on the affected side. An incision is to be made through the integuments of the space between the last rib and the crest of the ilium, commencing about three-quarters of an inch below the former, downwards and forwards for about four or five inches so as to cross the space obliquely. The latissimus dorsi and external oblique are next to be cut through to a similar extent, then the internal oblique and the transversalis fascia. The anterior margin of the quadratus lumborum will next be made out, partially divided, and drawn backwards to expose the lumbar aponeurosis, which being incised exposes the yellow fat in which the kidney is embedded, and which is sometimes thickened and otherwise altered by inflammation. It suffices to divide this by forceps or finger, and at first to lay bare the kidney only to a small extent. By palpation with the finger, a hard body may be felt; if not, puncture should be made with a long needle in different directions for the purpose of detecting the hard body. This found, often not without careful search and much difficulty, a slight incision may be made upon the needle towards the calculus, for on dividing the renal tissue blood flows very

freely, soon ceasing, however; but the incision should be further dilated by means of the dressing forceps, or by the finger itself, mostly preferable as enabling the operator to remove the calculus with a curette or other small instrument. Any vessels which bleed must be ligatured or twisted. A good-sized drainage tube is to be placed in the wound and secured there, the opening being closed by sutures around it. Similar proceedings suffice for the performance equally of nephrotomy and for nephrolithotomy. When the stone is very large, or branched, or when the kidney is involved in a considerable tumour, removal of the entire organ, or nephrectomy, will alone suffice, in which case the incisions already described must be carried further. But it is also generally desirable, after having approached the kidney, to make a vertical incision from near the posterior end of the wound downwards, in order to give room for the final proceedings of ligature, &c. In completing the operation, the capsule will be removed when practicable, and here the free use of the finger offers the safest and best way of accomplishing your purpose; but after long-standing organic disease or inflammatory action the capsule must be left and its contents cleanly detached and scraped out. The vessels and the ureter must be separately tied before dividing the pedicle, and the drainage tube used as before.

The removal of the kidney may also be effected by the abdominal section, an operation which ought to be conducted with the greatest possible care, in reference to the prevention of hæmorrhage into the peritoneal cavity, or other sources of irritation there. For most cases, I think surgeons will prefer the external route, unless it is for some special reason impracticable, because it avoids the risks of opening the peritoneal cavity, and affords a direct external route for draining the wound.

In these as in all other operations success arises not merely from the surgical skill and the habit of unfailing watchfulness which you may bring to the case and exercise in its interests, but largely from the pains and judgment which you have expended in arriving at the preliminary diagnosis. In that early stage of contact with your patient, deny yourself the fleeting satisfaction of shrewdly guessing: make with caution provisional theories, if you will, about a doubtful case—

indeed, the intellectual faculty must constantly do this, and without reference to the will—but arrive at no conclusion, take no action, except so far as you are warranted by facts.

I have reserved these few words to the last, as the most important. The first words I uttered in this course were designed to convey to you my strong sense of the importance of acquiring the habit of making an accurate diagnosis, and a rapid one, if possible. My last shall be to express once more the same conviction. Not because I undervalue the subject of treatment, but precisely with the opposite view; being anxious, above all things, that you and I should afford some essential service to those who have confided to us the care of their maladies. I adjure you to spare no pains to obtain the most complete knowledge of the complaint itself, since it is the only mode of arriving at a knowledge of what will be sound and efficient treatment.

I beg to thank you for the extreme attention and assiduity with which you have followed me during this course, and to assure you that such a manifestation on your part has rendered our meetings for these colloquial discourses some of the most agreeable relaxations which have fallen to my lot, to vary the routine of an anxious and very active professional life.

[The next lecture, so called here, was not adapted for oral delivery, but is the reprint of directions for the examination of the urine which I drew up several years ago and printed separately for the use of my class.]

LECTURE XXXII.

THE EXAMINATION OF URINE FOR CLINICAL PURPOSES.

Healthy Urine.

THE common or generally prevailing characters of healthy urine may be first stated, as affording the standard of comparison by which to estimate deviations existing in any specimen submitted for examination.

Healthy urine, recently passed, is transparent; possesses an amber colour, which may be faint, pale, full or dark, with a tint of orange-red, according to the degree of dilution in which the colouring matter exists. While fresh and warm, it has a characteristic odour. After standing a few hours, a faint light cloud is seen in the liquid, occupying about the lower fourth or third of the vessel in which it stands. Its specific gravity, at 60° Fahr., may be approximately regarded as varying between 1.010 and 1.030; the mean density being about 1.020.

Its reaction is slightly acid, and remains so until decomposition of the organic matter contained in the liquid has commenced. Heated to ebullition, its transparency remains. Mineral acids throw down no precipitates.

The quantity voided varies in different individuals, and in the same individual at different times, from the influence of season, food, exercise, &c. &c. From twenty-five to forty ounces in summer, and from thirty to fifty ounces in winter, may be considered as the average quantities; but considerable variations in quantity are consistent with perfect health. The solid matter contained in either case generally ranges between 700 and 900 grains in weight.

Rules for Examining Urine.

I. The urine to be examined should be in quantity not less than two or three fluid ounces, and for the most part a

portion of that which has been passed on first rising in the morning (*urina sanguinis*). Or a specimen of that which has been made at night (*urina chyli*) may be preserved also.

But no specimen is worth examining, inasmuch as it cannot be relied on as affording trustworthy indications, unless the urine has been separated, in the act of passing by the patient, into two portions. The first portion is to consist of a small quantity—say an ounce or so—sufficient to clear the urethra of any discharge which may happen to be in the canal. The second quantity is to consist of all that remains, which being passed through a urethra just flushed by the preceding portion, will be the true product of the kidneys, plus only any matters derived from the bladder itself. This is the portion which is to be submitted to the tests hereafter described. Purulent matter originating in the urethra is often mixed with specimens of urine sent for examination, in which case it may be erroneously estimated as albumen by the chemical test; or as pus under the microscope may be supposed to have its origin from the deeper passages.

II. Supposing it to be contained in a glass bottle, let the contents be entirely emptied into a tall conical glass, from which, after standing a short time, a portion of the deposit can be removed by a glass pipette. But before the fluid is disturbed, let the following particulars be noted from simple inspection by the naked eye:—

The colour of the liquid; which may be pale straw, yellow, orange, burnt sienna, red, crimson, or ‘smoky,’ up to dark brown, or blackish red.

The degree of transparency.

The characters of the deposit; such as, whether it be floating, flocculent, and scanty; ropy, viscid, and tenacious; dense, heavy, and abundant; dark or light in colour, white, pink, or purplish.

Its composition may frequently be predicated from this inspection alone by attention to rules hereafter given.

III. The urine having been left at rest for twenty or thirty minutes in the conical glass, a little of the deposit is to be transferred by a pipette to a glass slide, for examination under the microscope. Cover the specimen with a piece of thin glass, and view under a good half or quarter inch object-

glass. Generally speaking, I prefer the latter power, under which the accompanying illustrative figures were carefully drawn by myself.

IV. We may now proceed to test the bulk of the urine as follows :—

Decant it into the ordinary hydrometer glass, observing the odour, which may be fresh and normal, ammoniacal or ‘fishy,’ or fœtid.

Determine the reaction by litmus paper, which, if the urine be acid, will be turned red; the intensity of the colour corresponding with the amount of free acid present. If red-dened litmus be restored to its natural colour, or turmeric paper be rendered brown, the urine is alkaline. But urine which is acid when passed may become alkaline afterwards from decomposition: and, very rarely, urine may become more acid by keeping. Urine which is passed alkaline may be so from either of two sources. That which is the more common is the formation of ammonia in the bladder by decomposition. It has entered the bladder acid, and the urea breaking up, mostly in the presence of bacteria, gives off ammonia; crystalline phosphates, especially the triple forms, will also be found in the deposit. Urine may be alkaline as it comes from the kidney, but there will be no ammoniacal odour, and the deposit is mostly a white one, consisting of amorphous earthy phosphates. The urine passed shortly after a large quantity of tea or coffee has been taken is often neutral, or slightly alkaline, and clouded with phosphates.

Take the specific gravity, bearing in mind the influence of temperature if very accurate observations are required. For example, there is a difference of 6° in the sp. gr. of the same urine, at the two temperatures of 40° and 70° Fahr., which may be considered as representing those of winter and summer respectively. Temperature of 60° is always *understood* in all urinary reports. The specific gravity of healthy urine generally ranges between about 1·010 and 1·030. If the sp. gr. be lower than 1·010, water is present in large proportion to the solid matters, a condition very commonly occurring in health.

The urine should next be examined for albumen in solution, the presence of which may be ascertained by adding nitric acid, or by applying a temperature of not less than 160°

or 170° Fahr. In either case albumen is deposited in an insoluble form. The best method of applying these tests is, first, to heat a small quantity of the urine in a test-tube over the flame of a lamp, to the boiling point; if a flocculent whitish precipitate falls, it is either coagulated albumen, or an excess of earthy phosphates. Determine which, by adding a little nitric acid, which instantly dissolves the phosphates, but has no such effect on the albumen; bearing in mind that when the latter is present in very small quantity, too much nitric acid will dissolve the precipitate.

But when urine is alkaline, albumen is not precipitated by heat; in which case a drop of acetic acid—that is, *just sufficient to faintly acidify the mixture*—rather than of nitric acid, should be added. For it is not sufficiently pointed out in the directions ordinarily given for the performance of this test, that the presence of free nitric acid, in the proportion of one or two per cent., in albuminous urine, will prevent coagulation taking place when heat is applied. But if the necessary acidification is made with acetic acid, no difficulty will arise, as the presence of this acid will not hinder the coagulation of albumen. In all cases where the presence of albumen is suspected, the application of both heat and nitric acid is to be made, the effect of either being insufficient alone to constitute unquestionable evidence of its existence. The quantity of albumen may be approximately determined by observing the proportion which the coagulated deposit bears to the supernatant fluid, after the test-tube and its contents have been set aside for a time; and the time should be a constant one, such as fifteen minutes, to obtain similarity of results.

If the sp. gr. be high, as 1.030 or more, either the presence of sugar or excess of urea may be suspected. Or the urine may in such case be only a concentrated specimen, in which the fluid constituents exist in small proportion to the solids.

Diabetic urine has generally a sp. gr. of 1.030 and upwards. Moore's test is a simple and generally useful one for sugar, but it is by no means infallible, and is not to be relied on for small quantities. Boil the urine in a test-tube, with nearly half its bulk of pure liquor potassæ, for two minutes, when, if sugar be present, the liquid acquires a brown colour of greater or less intensity. Trommer's test consists in the addition of

about a third of its bulk of a solution of sulphate of copper [10 grains to one ounce of distilled water] to the urine in a test-tube. Sufficient liquor potassæ must then be added to produce a precipitate of the oxide of copper, and to redissolve it. The greenish-blue liquid is heated until it boils, when, if grape sugar be in solution, a red precipitate of the suboxide of copper is thrown down. But a more certain test than Trommer's is Fehling's standard copper solution, by which also the sulphate is reduced to the dark orange suboxide, by the presence of grape sugar. The most convenient mode of employing it clinically is in the dry form of 'pellets,' which are portable; each containing enough for solution in one drachm of water in a test-tube. A little of the suspected urine is added to this, the mixture is boiled, and the presence of sugar is shown by the dark orange precipitate described.

Dr. George Johnson has introduced a new test for sugar by picric acid, trustworthy and effective both for qualitative and quantitative analysis.¹

The fermentation test is no longer relied on for either. If a quantitative estimate is required, there is also an excellent system based on Fehling's test of ascertaining it.²

The presence of urea is thus determined. To a small quantity of urine in a test-tube, add half the quantity of pure nitric acid. Place the tube in cold water; flat rhomboidal or hexagonal crystals of the nitrate of urea soon appear in the fluid, if urea is present in excess. The acid gives no such result in urine of the normal composition. But this is a mode of observing without value for clinical purposes. To estimate the quantity of urea habitually excreted, the process of Liebig, or that of Russell and West, should be adopted. The latter is the more easy to accomplish. The ordinary quantity excreted by a healthy man is from 300 to nearly 500 grains daily.

If the urine be unusually high in colour, the cause may be an admixture of blood, when it will be either red or brown; or of bile, when it will have an orange or a bright 'burnt sienna' tint.

If it be due to the presence of blood, the colour, which may vary between that of porter and the faintest tint of red, disappears on simply boiling some of the fluid in a test-tube,

¹ *Albumen and Sugar Testing*. By Dr. Geo. Johnson. London, 1884.

² See *Lancet*, 1884, vol. i. p. 376.

the contents of which at the same time become opaque, and a deposit of dark coagula will take place, proportioned in amount to the quantity of albuminous matter present. Blood-corpuscles will always be seen under the microscope.

If not due to blood, wet the surface of a white plate with some of the urine to be examined, and let fall a few drops of nitric acid upon it, and if the colouring matter of bile be present, a brilliant play of colours (green, violet, red) around the acid will be instantly observed, which is transient in its duration. But if the bile be small in quantity, the appearance described will not be well exhibited unless the urine be concentrated by evaporation.

Before closing this section of the subject a mode of determining the true characters of a patient's urine, which is of value in some doubtful cases—a mode first recommended in this work—is explained here. The necessity for avoiding admixture of urethral products with urine, in order to ensure a pure specimen, has been enjoined, and the mode of attaining the object by the use of two glasses. It is sometimes quite as essential to avoid its admixture with products of the bladder. And it is not possible to make an absolute diagnosis in some few exceptional cases, without following the method in question. When, therefore, it is essential to obtain a pure specimen of the renal secretion free from the presence of vesical products, I pass a soft flexible catheter, of medium size, into the bladder, the patient standing, draw off all the urine, carefully wash out the viscus by repeated small injections of warm water, and then permit the urine to pass, as it will do, *guttatim*, into a test-tube, or other small glass vessel, for purposes of examination. The bladder ceases for a time to be a reservoir; it does not expand, but is contracted round the catheter, and the urine percolates from the ureters direct. The ureters are virtually lengthened as far as to the glass. Thus is obtained a specimen, which, for appreciating albumen, for determining reaction, and for freedom from vesical pus, and even blood, and from cell-growths of vesical origin, is of considerable value, and has sometimes furnished me with the only data previously wanting to accomplish an exact diagnosis.¹

¹ Now and then, although very rarely, in some states of the bladder, the presence of the gum catheter itself will occasion a little blood to exude from the

V. Examination of the deposit by the naked eye.

If a dense deposit be white, yellowish, or pink, and disappear by heat, it is almost certainly urate of soda. Sometimes this deposit has a dark red or brown colour. The urine in any case is almost invariably acid. The deposit of urate of soda completely disappears on heating the urine containing it.

If a dense white deposit do not disappear by heat, it is almost certain to be composed of the triple phosphates, in which case it will be dissolved by either acetic or nitric acid, and remain unaltered by the addition of ammonia or liquor potassæ. The urine is generally neutral or alkaline.

An orange or red deposit, which is visibly granular, sandy, or crystalline, is uric acid.

Oxalates do not form a visible deposit, although when large and numerous the naked eye will often detect innumerable small glittering points of light floating throughout the specimen containing them. They differ from the triple phosphates, small crystals of which they might be perhaps confounded with, by being insoluble in acetic acid, although dissolved by nitric and hydrochloric acids.

If a deposit be slight and flocculent, and unchanged by nitric acid, it consists chiefly of healthy mucus and epithelium.

If a pale, opaque, homogeneous layer, easily miscible with the urine, settle to the bottom of the vessel, and the urine be acid or neutral, it is almost certainly pus. If so, albumen may be detected in the deposit by heating it, and adding nitric acid, and in the supernatant fluid also, in small quantity. Lastly, agitate an equal quantity of liquor potassæ with a portion of the deposit, and if the latter be pus, a dense gelatinous mass will result; while if it be merely mucus, it will be less dense than before. If the mucus is more or less transparent and gelatinous, ropy, glairy, and tenacious, per-

mucous membrane lining the cavity. This being obvious to the eye will show a source of fallacy, and it is never to be forgotten that a very small proportion of blood-admixture with urine will give rise to a large albumen deposit, on the application of the usual tests. The value of the experiment, however, is not in the way of making manifest the presence of albumen in any doubtful case, but in showing that when it is largely present in the urine ordinarily passed, the urine drawn direct from the kidney may, nevertheless, be without a trace of it—a most important fact to determine.

haps containing minute air-bubbles, and is not miscible with the urine, it is probably mucus or muco-pus only, and the urine is generally alkaline. If the urine is acid, such a deposit is certainly mucus. But in alkaline urine pus forms an opaque and glairy deposit. A glairy deposit may be opaque from the presence of phosphates; if so, a drop or two of nitric acid will dissolve them and render the deposit comparatively clear. The microscope will most readily decide the question, especially when the deposit is small in quantity.

Liquor puris contains albumen. Liquor mucii does not.

Acetic acid has no visible effects upon an admixture of pus and urine. Added to urine containing mucus, a wrinkled membrane-like matter is seen floating through it, presenting a very characteristic appearance.

VI. In examining the deposit under the microscope, any doubt respecting its elements will be cleared up.



FIG. 116.

Under the quarter-inch object-glass, the ordinary appearances of the deposits commonly met with are as follows:—

URIC ACID. (Fig. 116.)—Primary form, rhombs, of which numerous modifications are seen (*a, a*); the most common exhibiting angles which are truncated or obtuse. It occurs most commonly in lozenge-shaped crystals and rhomboidal prisms, of which the size and thickness vary greatly. Colour,

usually pale amber, like that of barley-sugar, but the tints range between faint straw and deep orange-red. Sometimes in shapeless masses of cohering prismatic or lozenge-shaped crystals (*b, b*) ; these are the 'red sand' and 'cayenne pepper' deposits which are seen by the naked eye.

URATE OF SODA generally appears as a dark amorphous deposit which a high power shows to consist of minute particles cohering to a greater or less extent, in strings or in masses. (Fig. 117, *a*.) This is, perhaps, the most frequently

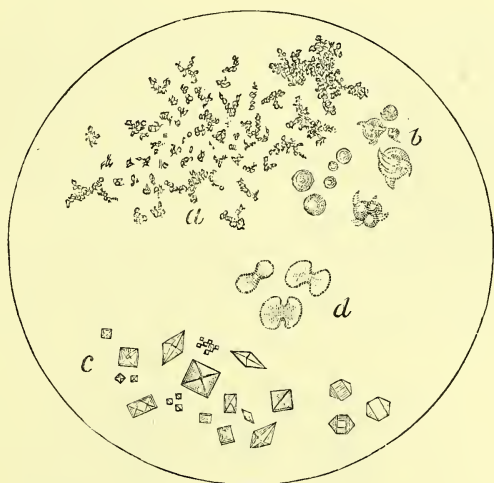


FIG. 117.

occurring precipitate which is deposited from the urine. Rarely it assumes the form of minute opaque balls of a reddish or reddish-yellow colour, either with or without little projecting spiculæ, which latter appear to be composed of uric acid (*b*). It is not a combination in definite proportions of acid and base, but has probably the latter in excess. Urate of ammonia is rare : when present it is usually in irregularly formed globular masses.

OXALATES.—Common in sharply defined octahedral forms, colourless and transparent ; of all sizes, some being exceedingly minute. (Fig. 117, *c*.) Very rarely indeed in a dodecahedral form. This deposit is sometimes replaced and sometimes accompanied by small crystalline bodies, described

as possessing a 'dumb-bell' form (*d*). Their appearance is rare as compared with that of the octahedra. Probably their constitution is not the oxalate, but the oxalurate of lime, a closely allied salt.

CYSTINE.—This is another crystalline deposit, which is rarely met with in the urine. It appears in more or less regularly formed six-sided tablets, with a slight tinge of fawn or yellowish colour.

THE PHOSPHATE OF AMMONIA AND MAGNESIA, OR NEUTRAL TRIPLE PHOSPHATE.—In colourless, transparent, three-sided prisms, usually of large size, not easy to mistake. (Fig. 118, *b*.) The summits of these crystals exhibit great variety in the form and number of their facets. Occasionally it occurs in the stellar form, from the coherence of several small prisms, or as a rosette, where the crystals are acicular and in great number. Very rarely the neutral triple phosphate appears in double penniform crystals.

The bibasic form of the triple phosphate occurs in foliaceous and stelliform crystals, and is found in stale and highly alkaline urine, never in that which is acid. It appears to be



FIG. 118.

a secondary formation occurring in the urine after it has been passed, and very frequently to be developed from pre-existing prismatic crystals of the neutral phosphate by gradual change.

First, the prismatic crystal becomes cleft at each extremity, then slight indications of the foliaceous markings are seen diverging from near the centre to each angle, so that by degrees four branches are developed, somewhat in the form of a cross, while the angular outline of the original crystal disappears. Two new branches are frequently added afterwards, and thus the six-rayed form of this salt is produced; *a, a, a, a*, indicate these crystals in different stages of development, sketched by myself from two specimens at different periods in the course of three days.

PHOSPHATE OF LIME occurs sometimes as a pellicle on the surface of alkaline urine, usually of minute granules; and it is often deposited with crystals of the neutral triple phosphates adhering to them, and lying free in the field. (Fig. 118.)

RED BLOOD CORPUSCLES.—Small circular flattened disks, with a faint yellowish tint; smooth, semi-transparent, and non-granular; slightly concave on each face (fig. 119, *c*), but

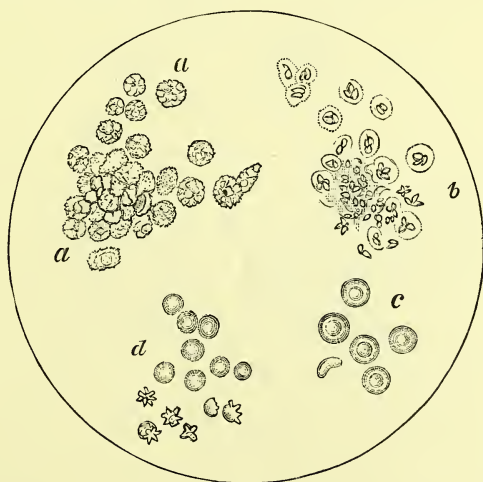


FIG. 119.

plump and spherical in urine of low specific gravity from endosmosis; sometimes shrivelled, with serrated edges, or burst (*d*). The diameter is about the $\frac{1}{3500}$ of an inch in the natural flattened state, but when distended in urine, is somewhat less. There is no nucleus in the red corpuscle. The white blood corpuscle is larger, varying in size from the $\frac{1}{3000}$

to the $\frac{1}{2000}$ of an inch in diameter; it exhibits a tripartite nucleus on the addition of acetic acid.

PUS CORPUSCLES. (Fig. 119, *a, a*.)—Variable in size, generally larger than blood corpuscles; from about $\frac{1}{3000}$ to $\frac{1}{2000}$ of an inch in diameter, white, rather opaque, granular aspect externally, with two or three nuclei, sometimes four, often faintly seen, but made distinct by the addition of acetic acid (*b*).

Mucus contains no specific corpuscle. Any such bodies in it are probably pus corpuscles, with which it is most frequently mixed.

EPITHELIUM is often found in considerable quantity in the urine, and it offers bodies of various form to the observer: flat and spheroidal; the former largely in the urine of women; round, oval, and caudate, frequent in that of men. (Fig. 120, *a*.) From parts of the bladder and the ureters, the epithelium

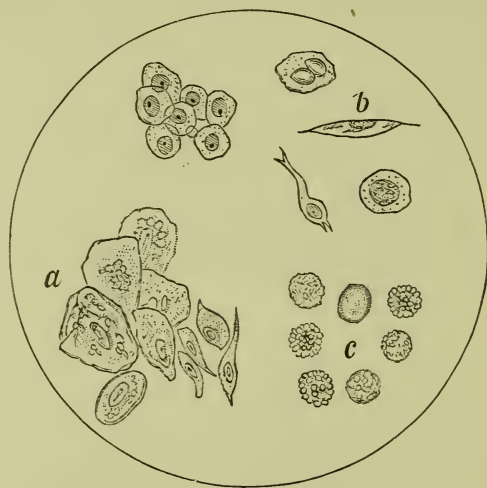


FIG. 120.

is often prismatic or caudate (*b*) or oval. Small rounded epithelium, and the caudate or spindle-shaped variety, have often led inexperienced observers to form conclusions in relation to the presence of cancer, which have not been warranted, referred to at page 419. (*c*) Diseased cells, chiefly renal.

URINARY CASTS of the uriniferous tubes of the kidney. (Fig. 121.)—In acute nephritis, epithelial casts are always thrown off in abundance; and blood corpuscles may often be

found in the cast. The character of the cast is more 'granular,' with less of epithelium, in chronic nephritis. In fatty degeneration of the kidney, the cast contains oil globules. A semi-transparent cast, containing few or no organic corpus-



FIG. 121.

cles, known as the 'hyaline' or 'waxy cast,' appears in renal changes of a chronic kind. No doubt an occasional cast may be found in the absence of renal disease; but when their appearance is persistent, some organic change, either acute or chronic, is certainly present.

PIGMENT.—Little bodies of irregular form, of an orange or orange-red colour, are frequently seen in urine. Some of these are partially transparent, and some opaque, and others almost black. They are sometimes confined by a cell-wall, and sometimes they present an amorphous character. They are evidently pigmentary in their nature, and have no pathological import.

SPERMATOCOA are frequently to be found in the urine of those who are perfectly healthy. When their presence is constant, and then only, is the circumstance to be attributed to disease.

VEGETABLE FUNGI appear in urine very soon after it is passed, in certain conditions. In acid urine, the *Penicillium*

glaucum appears : the *Torula cerevisiæ*, or yeast-plant, in diabetic urine. Bacteria are present in all urine in which decomposition has commenced, and are probably the active agents in producing changes of this nature. It is said to be chiefly through the action of bacteria (*Bacterium ureæ*) that urea is broken up into ammonia.¹

ACCIDENTAL BODIES, met with in the microscopical examination of the urine, are chiefly hair, cotton, and flax fibres, feathers, woollen, silken, starch granules, and woody fibres, forming dust introduced into the vessels which contain the specimen to be examined. When these have been once seen and identified, they cease to puzzle the student; and as they are very abundant there is no difficulty in observing their specific characters. Globules of oil are easily identified, being often mixed with the urine when using the catheter. It should not be forgotten that striped muscular fibre and vegetable tissues are occasionally met with, when, owing to the presence of organic disease in the bowel involving the adjacent bladder, perforation has taken place and fæcal matters enter.

¹ *Manual of Bacteriology*, pp. 242-3. By E. M. Crookshank. 2nd edition. London, 1887. Lewis.

INDEX.

	PAGE		PAGE
ABUSE of instruments	45, 53	BACTERIA in the urine	380
Accidental bodies in urine	460	Badly-curved catheter	123
Accidents met with in lithotrixy	253	Battery for Nitze-Leiter endo- scope	21
Accuracy in diagnosis	5	Belladonna	128
Acetate of lead, as injected into bladder	376	" in juvenile incontinence	381
Acetic acid, injection of, into bladder	376	Benzoic acid	380
Acids, effect of, on urine	379	Bernard's researches on the liver	328
" in cystitis	379	Biborate of soda and glycerine in- jected into bladder	376
Acute recurring urinary fever	182	Bigelow, aspirator of Prof.	224
Administration of mineral waters	333	" his proposals	229
Advanced prostatic disease	144	Bilateral lithotomy	261
Age, in stone operations	193	Bile in urine	451
Albumen in urine	449	Bilharzia Hæmatobia	437
Alchemilla arvensis	378	Bistouri caché, small	93
Alcohol in the diet of calculous patients	341	Bladder diseases of	384
Alicant soap	352	" obscure disease of	393
Alkalies as solvents of stone	357	" diagram of	31
" help to control cystitis	379	" anodynes for	377
" in cystitis	379	" aspiration of	161
Alkaline treatment of gravel	326	" atony of	385, 388
" " " stone	357	" inspection with the en- doscope	22
Anæsthetics in lithotrixy	228, 230	" foreign bodies in the	25
Anklets, use of, in lithotomy	266	" opening above pubes	153
Anodynes in the bladder	377	" paralysis of	384
Antiseptics in catheterism	368	" rectal puncture of	163
'Apparatus major'	257	" distension	297
Aspiration of bladder in retention	161	" paralysis of	117, 387
Aspirator of Sir P. Crampton	222	" digital exploration of	397
" of Clover	222	" cases illustrating digital exploration	405
" of Bigelow	224	" operation for	399
" of author	225	" tumours of	24, 409
" how to use the	237	" symptoms of	416
Astringents for injection into the bladder	376	" irritable bladder	282, 409
Atony of bladder	385	" malignant tumours of	415
" " treatment of simple	388	" washing out	373, 404
Author's aspirator	225	Blades of lithotrite described	218
" lithotrite	216	Bleeding after lithotomy	271
" stricture dilator	99	" " lithotrixy	253
" washing-out apparatus	249	Blister, effect of a	369
Avery, endoscope of	19	Blistering in prostatitis	382

	PAGE		PAGE
Blood in calculus . . .	15, 201	Catheterism, results of . . .	178
„ in cystitis . . .	15	„ „ exceptional dangers . . .	143
„ in prostatitis . . .	15, 436	of „ . . .	143
„ in urine . . .	7, 439, 451, 457	Catheters, best for daily use . . .	141
„ poisoning after lithotripsy . . .	244	„ „ evacuating . . .	226
Bougies, flexible, French . . .	57	Caustics in stricture . . .	83
„ how to pass them in . . .	57	Celsus on lithotomy . . .	257
„ healthy urethra . . .	57	Chalky gout . . .	325
„ with point turned up . . .	42	Charrière's lithotrite . . .	216
„ blunt-ended . . .	47	Chemical agents in stricture . . .	83
„ small twisted . . .	75	„ „ varieties of stone . . .	198
Bright's disease . . .	316	Cheselden's lithotomy . . .	259, 265
Brodie, Sir Benjamin . . .	45, 108	Children, stone in . . .	192
Browne's, Mr. Buckston, dilatable . . .	273	„ „ sounding for . . .	277
air tampon . . .	273	„ lithotomy in . . .	276
Buchu . . .	142, 378	„ „ suprapubic operation . . .	277, 280
Bulbous bougies in stricture . . .	56	„ „ „ satisfactory results of, in . . .	299
„ exploring instruments . . .	50	Choice of operation for stone . . .	279
„ urethrotome . . .	99	Chronic retention . . .	159
		„ „ is catheter to be used in ? . . .	159
CALCULOUS nephralgia . . .	443	Citrate of potash as a solvent . . .	358
Calculus, vesical. (See Stone)		Citric acid . . .	380
Cancer, villous growth . . .	411	Civiale's urethrotome . . .	95
„ of prostate . . .	419	„ lithotrite . . .	213, 216
Cancer-cells in urine . . .	458	„ „ medio-bilateral lithotomy . . .	262
Cantharides, effect of . . .	369	Clark, Sir A., on urinary fever . . .	184
Carbolic acid, injection into bladder of . . .	376	Classification of urinary diseases . . .	2, 8
Carbolised oil for instruments . . .	368	Cleaning catheters and lithotrites . . .	368
Carlsbad dietary . . .	345	Clothing . . .	349
„ salts . . .	335, 338	Clots of blood in bladder . . .	438
„ water . . .	334	Clover's aspirator . . .	222
„ „ advantage of a home course . . .	336	Cocaine in lithotripsy . . .	239
Cases of suprapubic opening of bladder . . .	150, 427	Cock, Mr., on rectal puncture of bladder . . .	163
„ illustrating digital exploration of bladder . . .	405	Colic, nephritic . . .	441
Casts, renal . . .	459	Conical steel bougies . . .	60
'Catarrh of bladder' . . .	142, 371	Constant catheterism . . .	137
Catheter, how tied-in . . .	63	Construction of lithotrite . . .	214
„ very fine gum . . .	72	Contagious chronic cystitis . . .	367
„ slender silver . . .	72	Continuous dilatation . . .	62
„ oversliding . . .	81	„ „ fever after . . .	65
„ coudée . . .	118	Contrexéville water . . .	326, 335
„ over-curved gum . . .	124	Copaiba . . .	379
„ moulding of . . .	125	Couch grass . . .	378
„ silver prostatic . . .	126	Coudée catheter . . .	118
„ bicoudée . . .	125	Counter-irritants in cystitis . . .	378
„ vulcanised indiarubber . . .	122	Cruise's endoscope . . .	20
„ cleaning of . . .	368	Crushing the stone . . .	234
„ fever . . .	180, 185	Cubebs . . .	379
„ „ treatment of . . .	186	Cutting on the gripe . . .	257
„ „ evacuating . . .	226	Cystine . . .	456
Catheterism, constant . . .	137	Cystitis . . .	9, 365
„ in partial retention . . .	127	„ after lithotripsy . . .	245
„ in complete retention . . .	129	„ chronic, after lithotripsy . . .	245, 367
„ when necessary . . .	137	„ causes of . . .	245, 367
		„ severe acute . . .	369

	PAGE
Cystitis from contagion . . .	368
" ordinary acute . . .	367
" treatment of . . .	370
" " " severe acute . . .	369
" chronic . . .	370
" " treatment of . . .	373
Cysts of bladder . . .	365
DANGER from using large lithotrites . . .	45
" " " oversized in- struments in stricture . . .	45
Débris, withdrawal of . . .	221
Decoctions, various, in cystitis . . .	378
Deposits, phosphatic . . .	456
" in urine . . .	454
Desormeaux, endoscope of . . .	20
Diabetes . . .	9, 309
Diabetic urine . . .	450
Diagnosis . . .	1, 18
" method in . . .	5
" the six chief questions in . . .	6
" use of instruments in . . .	18
" of a simple case of stric- ture . . .	47
" of senile enlargement of prostate . . .	386
" of stone . . .	201
" of tumours . . .	416
" of renal calculus . . .	313
" in obscure diseases . . .	395
" physical signs in . . .	16
Diet . . .	343
" at Carlsbad . . .	345
" in uric-acid diathesis . . .	325
Dieulafoy's aspirator . . .	161
Difficulties in treating stricture . . .	67
Digital exploration of the bladder . . .	393
" " in obscure dis- ease . . .	395
" " invaluable for diagnosis . . .	397
" " mode of per- forming . . .	399
" " tapering direc- tor for . . .	400
" " results achie- ved by . . .	401
" " forceps for re- moving tu- mours after . . .	403
" " easy in the female . . .	404
" " cases illus- trating . . .	405
Dilatability of urethra . . .	52
Dilatation of stricture . . .	52
" simple . . .	53
" continuous . . .	63

	PAGE
Dilatation of urethra behind stric- ture . . .	79
" of ureters . . .	311
" of bladder . . .	311
" of kidneys . . .	311
Dilating instruments . . .	59
Dilators, metallic . . .	60
Directions for using aspirator . . .	237
Dissection for lithotomy . . .	264
Distending instrument for stric- ture . . .	89
Dittel, Prof., in favour of the supra- pubic operation . . .	299
Dolbeau's operation . . .	262
Dupuytren's lithotomy . . .	261
EARLY detection of stone . . .	319
Electricity as a stone solvent . . .	364
" in treatment of stric- ture . . .	83
Empirical remedies for stone . . .	354
Endoscope, the . . .	19
" of Avery . . .	19
" of Desormeaux . . .	20
" of Cruise . . .	20
" of Leiter . . .	20
" of Warwick . . .	20
" for exceptional cases only . . .	27
Endoscopic sound . . .	22
English gauge . . .	59
" lithotrites . . .	218, 220
Engorgement of bladder . . .	117
Epithelioma of bladder . . .	418
Epithelium in urine . . .	458
Ether in lithotripsy . . .	230
Evacuating catheters . . .	226
Evian water . . .	326
Examination of the patient by questions . . .	6
" physical . . .	17
" of urine . . .	13, 447
" for stricture . . .	47
" per rectum for en- larged prostate . . .	110
" digital, for tumours in bladder . . .	397
Exercise . . .	348
Exploration, digital, of bladder through the perineum . . .	398
Exploring instruments in stricture . . .	50
External meatus, stricture at . . .	93
" urethrotomy . . .	85, 400
" " without a guide . . .	86
" " with a guide . . .	87
Extravasation of urine . . .	166
" " signs . . .	167
" " treatment . . .	168

	PAGE		PAGE
FALSE passages	77	HÆMATURIA	434
Fehling's test for sugar in urine	451	" diagnosis of	409, 434
Fergusson's lithotrite	215	" persistent vesical	427
Fever after lithotrixy	253	" sources of	435
" urinary	180	" treatment of	437, 442
" " treatment of	186	" after lithotomy	253
Fine gum catheters	72	" of 'gouty' kidney	441
" silver "	72	Hæmorrhage from vesical tu-	
Fish diet	345	mour	427
Fistulæ	166	" " kidney	436
" simple urinary	170	" " prostate	436
" three chief forms of	171	" " stricture of	
" indurated urinary	171	urethra	437
" with loss of substance	173	" " bladder	437
" treatment of	175	Hand, sensitive and educated, im-	
" urethro-rectal	176	portance of	58
Flat director for suprapubic oper-		Hawkins', Sir Cæsar, gorget	259
ation	301	Heath, Mr. C., suprapubic opera-	
" -bladed lithotrite	221	tion by	430
Flexible and inflexible instruments	55	Heurteloup's method in lithotrixy	215
Fomentations in cystitis	378	Hip bath after lithotrixy	240
Food and diet	340	Hippocrates' allusion to lithotomy	256
Forceps, long urethral	243	Holder of staff in lithotomy	266
" lithotomy	270	Holt's operation	88
" for removal of vesical		Home's, Sir E., casts of urethra	32
tumour	403	" " on stricture	45
Foreign bodies in urethra, expul-		Hot fomentations	378
sion of	33	How to obtain a fair specimen of	
" " in the bladder	25	urine	12
Fragment, search for last	243	" pass a bougie in stricture	49
" impacted in urethra	242	" " " in healthy	
Franco's operation	291	urethra	57
Franzensbad water	335	" pass a lithotrite	231
French coudée catheter	118	" " sound for stone	203
" olivary instruments		" seize a stone in lithotrite	234
" gauge	59	" find the last fragment	243
" flexible bougies	61	" fix a catheter	63
Frequent micturition	114, 395	" use the aspirator	237
Frère Jacques' operation	259	Hunyadi Janos water	332
" Côme's lithotome caché	261	Hypertrophy of prostate. (See	
" " high operation	293	Senile Enlargement)	
Friedrichshall water	333		
Fungi in urine	459		
		IMPERMEABLE stricture	69
GALVANIC cautery	176	Incision in lateral lithotomy	267
Garson's rectal distension	297	Incontinence of urine	115
Gauges	59	" " after litho-	
Glauber's salts, value of	335	tomy, in women	288
Glycerine and borax, injection of	377	Indiarubber catheter	122
Gonorrhœa a cause of cystitis	367	Indigestion in torpid liver	329
Gorget, the cutting	261	" in juvenile inconti-	
" the blunted	271	nence	392
" for children	276	Inflammation of prostate causing	
Gout	325, 368	retention	157
'Gouty kidney'	441	" of neck of bladder	366
Gravel, early history of	322	Infusions and decoctions in	
" treatment of	325	cystitis	378
Gripe, cutting on the	257	Injections for the bladder	375
Guthrie, Mr.	32, 159	" for urethra	32
		" of oil	74

	PAGE
Insertion of tube into bladder	
above pubes	153
Instillation of bladder	375
" syringe	375
Instruments, dilating	54
" flexible or inflexible	55
" improper use of	45, 53, 367
" cleaning of	368
Internal urethrotomy	92
" " instruments	
used in	93
" " how it	
should be	
performed	101
" " author's ex-	
perience	103
Involuntary micturition indicates	
retention	115
Irritable bladder	409
Ivory separator for suprapubic	
operation	301
JOHNSON'S, Dr. George, test by	
picric acid	451
Juvenile incontinence	389
" " treatment of	390
KIDNEYS, disease of, in stone	
operations	307
" " hæmaturia	
from	435
" damaged by calculus	309
" congestion of	416
" operations on	445
Knife, lithotomy	270
LARGE lithotrites to be avoided	
unless necessary	250
Last fragment	243
Lateral lithotomy, origin of	259
" " anatomy of the	
operation of	263
" " preliminary	
treatment of	
patient for	264
" " passage of the	
staff in	265
" " position of	
patient in	267
" " incision in	268
" " introduction of	
forceps in	270
" " hæmorrhage in	272
" " after treat-	
ment in	273
Lead, acetate of, as an injection	
for bladder	376
Lead stylets	61

	PAGE
Leiter's endoscope	20
Lemon juice	380
Linseed poultice above the pubes	378
Liston, Mr.	55, 162
Litholapaxy, term inappropriate	229
Lithotome caché of Frère	
Côme	261
Lithotomy, early history of	255
" cutting on the gripe	257
" Marian operation	257
" suprapubic	259-289
" gorget	261, 271
" lateral, early origin of	259
" median	274
" bilateral	261
" medio-bilateral	262
" pre-rectal	262
" staff	265
" lateral, for adults,	
mode of performing	
.	264-271
" in children	276
" suprapubic, easy and	
safe	277, 280
" in women	287
" or lithotripsy in renal	
disease ?	316
" forceps	270
" knife	270
" gorget	271
" or lithotripsy ?	278
" position of patient	263
" lateral, rules for per-	
forming	265
" anklet and wrist piece	266
" yoke	267
" treatment of hæmor-	
rhage	273
" mortality	285
Lithotrite, of Civiale and Charrière	216
" author's first	216
" fenestrated	218
" non-fenestrated	219
" flat-bladed	220
" construction of	221
" passing a	231
" rules for introducing	
the	231
" manner of handling	
when searching	232
" manner of holding and	
crushing	234
" caution against using	
large	250
Lithotripsy at one sitting	229
" unequalled in its safety	251
" Bigelow's proposal	224
" patient's health before	
operation	229
" its history	213

	PAGE		PAGE
Lithotrity, details of the operation		Nephrectomy	445
of	227, 230	Nephritic colic	443
" position of patient	233	Nephrotomy.	445
" seizure of the stone	234	Nephro lithotomy	445
" crushing the stone	234	Nitrate of silver, injection of, into	
" search for small frag-		bladder	376
ments	235	Nitric acid, injection of, into	
" employment of aspi-		bladder	376
rator	237	Nitze-Leiter endoscope	20
" local disease being		Nursing, good, important	186
present	283		
" cystitis after	227	OBLITERATION of urethra	70
" on dead body	253	Obscure disease of bladder	393
" contingencies possible		" " " digital exploration for	397
during and after	251	Obstruction about the neck of the	
" after-treatment	240	bladder	145
" in presence of renal		Oil, injection of	74
disease	317	Operation for discovering and re-	
" choice of instruments	239	moving tumours of the blad-	
" after-troubles of	241	der	425
Liver, defective action of	328	" " " case of	405, 427
		" for relief of advanced	
MAISONNEUVE's urethrotome	95	cases of prostatic	
Male blade of lithotrite, wedge-		disease	133-144
shaped	220	" on the kidney	445
Marian operation	257	Opiates in vesical disease	421
Marienbad water	334	Opium	127
Median lithotomy	274	Organic stricture	36
Medio-bilateral lithotomy	274	Over-curved gum catheter	124
Method of tying-in catheter	63	Over-distension of urethra	89
Micturition, frequent	114, 395	Oversliding catheters	81
" involuntary	115	Oxalates	455
" obstructed	107		
Milk diet	347	PAIX, nature and seat of	9
Mineral waters	331	" in stone	200
" " course of, for cal-		Painful micturition, in relation to	
culous patients	337	diagnosis	112
Moore's test for diabetic urine	450	Papillomata of bladder	411
Morand's report on Cheselden's		Paralysis of bladder	117
operation	259	" " signs of true,	
" " on Mrs. Ste-		and its treatment	387
phens' remedies	353	Pareira brava	142, 378
Morphia as an injection for		Passages, false	77
the bladder	377	Passing a lithotrite	231
" subcutaneous injection		Pavy's researches on the liver	328
of after lithotrity	240	Pelvic outlet	263
" subcutaneous injection of		Pelvis and bladder, section of	164, 296, 297
in nephritic colic	443	Perineal section for stricture	86
Movement of foreign bodies in		" operation for examining	
urethra	33	the bladder	393
Myoma of bladder	415	" " " for relieving	
		advanced prostatic disease	381
NAPOLEON III., case resembling		Peritoneum, important question	297
that of	305	Perrève, dilator of	88
Neck of bladder, stricture at	43	Petersen's suprapubic operation	298
" " inflammation of	366	Petticoat tube	273
Nélaton's pre-rectal lithotomy	262	Phosphate of ammonia in urine	456
Nephralgia, calculous	443		

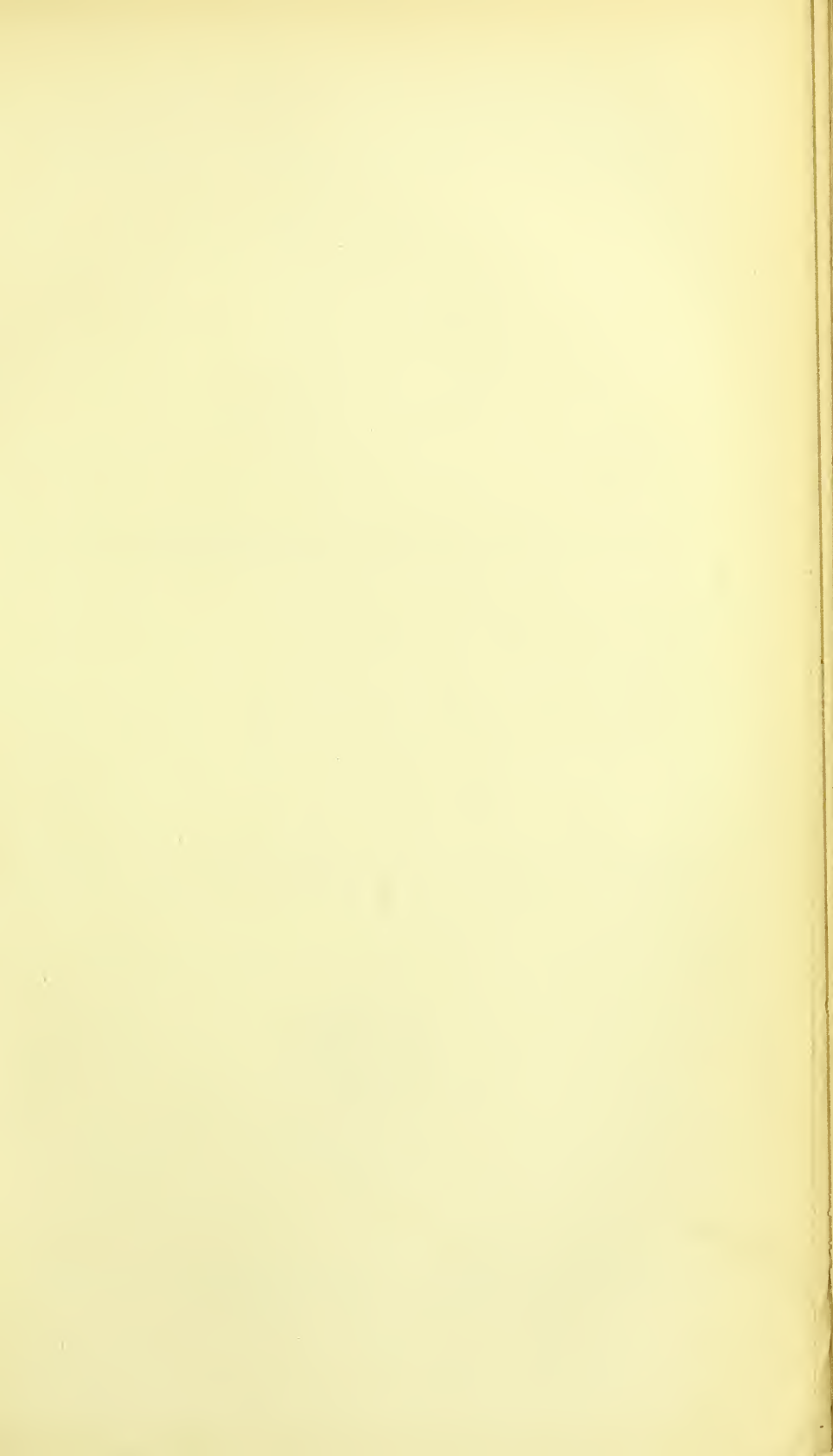
	PAGE		PAGE
Phosphate of lime in urine	457	Renal calculus, diagnosis of	315
Phosphatic deposits	247, 457	" " removal of, from	
" " treatment of	248	kidney	442
" " under micro-		casts	459
scope	456	disease, operations in pre-	
Pigment in urine	459	sence of	317
Plastic operations for urinary fis-		" " prognosis	316
tula	173	‘Residual urine’	119, 136, 184
Pliny mentions solution of stone.	351	" " how determined	137
Polypoid tumours in bladder	411	" " is catheter neces-	
Position of patient in lithotrity	233	sary?	138
Pre-rectal lithotomy	262	" " cautions in rela-	
Prevention of calculous formation.	320	tion to the use	
Prichard's anklets and wrist-		of catheter for	138
bands	266	" " serious condition	143
Prostate, senile enlargement of	107, 386	Resilient stricture	82
" " " sections show-		Resins, the, in cystitis	379
ing	111	Retention, prostatic	129, 157
" " " age at which		" chronic	159
it occurs	111	" typical forms of	157
" " " symptoms	111	" in young men	156
" " " diagnosis.	111, 114	" from inflamed prostate	157
" " " retention from	115	" from stricture	159
" " " physical dia-		" after lithotrity	247
gnosis	117	" operative treatment	161
" " " treatment	120	Return of stone after operation	247
" " " medicine in	121	Rheumatism, a factor in cystitis.	368
" " " catheterism	123	Rigors in cases of stricture	91
" " " operations for	133, 144	" from septicæmia	183
Prostatic retention	129, 157	Roberts, Sir W., on stone solvents	358
" " treatment of	129	Rupture of stricture by operation	88
" silver catheters	126		
" tumours	111	SCALES, French and English, com-	
" enlargement.	107, 386	pared	59
Prostatitis	9, 365	Scirrhus and encephaloid of blad-	
" urine in chronic	13	der	419
" acute	381	Search for last fragment	243
" chronic	8, 381	" fortumour-débris by sound	417
" suprapubic opening		Seizing the stone in lithotrity	234
for exceptional cases	381	Senile enlargement of prostate	107, 386
" symptoms of	381	" " " importance of age	111
" treatment of	382	" " " sections showing	111
Püllna water	332	" " " diagnosis of, 111, 114	
Puncture of bladder per rectum	163	" " " symptoms of	111
Pyæmia	183	" " " retention from	115
Pyelitis	144, 316	" " " phys'cal diagnosis	117
		" " " treatment	120
QUESTIONS to be asked in dia-		" " " medicine in	121
gnosis	6	" " " catheterism	123
		" " " operations for 133, 144	
RAPID diagnosis	5	Sensibility of urethra	178
Reaction of urine	449	Sensitive and educated hand	58
Rectal bag for suprapubic opera-		Septicæmia	183
tion	300	Shield with tube for suprapubic	
" examination	417	opening	153
Rectal puncture of bladder	163	Shock	178
Renal calculus	305	Silver prostatic catheters	126
		Simple dilatation	53

	PAGE		PAGE
Simple urinary fistula	170	Stricture, simple dilatation of	53
Single sitting, lithotripsy at	229	" force not to be used	73
Six questions in diagnosis	6	" metallic dilators for	60
Size of stone	205	" continuous dilatation	65
Sliding catheters	81	" difficult cases	67
Small fragments, seizing	235, 243	" impermeable	69
Soda and glycerine, injection of,		" narrow	71, 101
into bladder	377	" tortuous	75
Solution of phosphatic calculi	363	" " diagrams of	76, 94
Solvents for stone	350	" false passages	77
Sounding for small stones	203	" resilient	82
" for stone	205	" non-dilatable	83
" children for stone	277	" chemical irritants un-	
Sounds	151, 202, 206	necessary	83
" how to use	203	" electrical treatment	84
" forms of	202	" external division of	87
Spasmodic stricture	38	" rupture of	88, 90
Specific gravity of urine	449	" over-distension of	89
Spermatozoa	459	" internal urethrotomy	92
Spirits, objectionable in urinary		" at external meatus	93
fever	186	" undilated, cause of fistula	170
Staff, holding	267	" fallacy in diagnosis	40
" lithotomy	265	" Sir E. Home on	45
" Syme's	87	" instruments for	54
" Wheelhouse's	86	" anatomical knowledge	
Steel dilators	60	embarrassing	57
Stephens', Mrs., stone solvent	352	Styptics, caution	439
Stone in bladder	189	Subcutaneous injection of mor-	
" age at which most common	193	phia	240, 443
" in children	192	Sugar in urine	451
" in women	287	" in diet to be avoided	345
" history of formation	198	Suppositories, morphia	127, 273, 377
" three chief varieties of	199	Suprapubic opening of bladder	150, 165
" varieties of	189	" " " instrument	
" classes most subject to	197	for	151
" symptoms of	199	" " " after treat-	
" sounding for	201	ment	153
" determination of size of	205	" " " shield	153
" multiple calculi	207	" " " tube	153
" lithotripsy	211	" " " for tumours,	
" seizing the, in lithotripsy	234	304, 425	
" return of, after operation	247	" " " cases	
" in women and children	287	of	150, 427
" preventive treatment of	321	" lithotomy	289
" solvents for	350	" " two sources	
" pain of	10, 70, 200	of danger	293
" mortality of operations	284	" " less danger-	
" what is it ?	191	ous than	
" hospital records concerning	193	the lateral	295
" questions to be asked	200	" " history of	
' Storms ' of uric acid	324	the opera-	
Stream of urine	38, 113	tion	291
Stricture of urethra	35	" " important	
" organic	36	question	
" spasmodic	37	of the pe-	
" inflammatory	37	ritoneum	297
" symptoms of	38	" " Guyon's	
" diagnosis of	39, 49	cases	299
" at neck of bladder	43	" " steps of the	
" dilatation of	52, 79	operation	301

	PAGE		PAGE
Suprapubic lithotomy for children	277, 299	Tumours of the bladder, treatment	419
" " the stone		Turpentine, Venice	379
extracted		Twisted stream	39
with the		Tying-in a catheter	63
fingers .	302		
" " rectal bag .	300	URATE of soda	455
" " ivory separ-		Urea in urine	451
ator .	301	Ureters, dilatation of	313
" " flat director	301	Urethra not a tube	29
" " end of sound	304	" physiologically con-	
Surgical diseases of urinary or-		sidered	31
gans	3	" stricture of	35
Syme's axiom about impermeable		" inflammatory stricture of	37
stricture	69	" spasmodic "	37
" staff and operation . .	87	" diagram of healthy . .	42
Synopsis of subjects	2	" dilatability of strictured .	52
Syringe instillation	375	" sensibility of	178
		" inspection with the endo-	
TABES dorsalis	388	scope	25
Tampon, the dilatable air . .	273	" valvular action of . .	33
Tapering director or gorget .	400	" how to inject fluid into .	33
Tannic acid, as an injection for		" sections of, showing stric-	
bladder	376	ture	80
Tapping bladders over pubes .	163	Urethral injections	
" " per rectum .	163	" how to inject properly .	33
Tea, hot, in urinary fever . .	180	" long forceps	243
Tenaculum, use of, in lithotomy .	272	" fistulæ	169
Tortuous strictures	74	" fever	180
Treatment of stricture	52	Urethro-rectal fistulæ	175
" difficult stricture .	67	" " treatment of	176
" senile enlargement		" " after litho-	
of prostate .	120	tomy .	176
" extravasation of		Urethrotomes of author	99
urine	168	" of Maisonneuve and	
" retention of urine .	129	Civiale	95, 98
" cystitis	369	Urethrotomy, external	85, 400
" dietetic, of calcu-		" internal	92
lous patients .	341	" author's experi-	
" prostatitis, chronic	382	ence of	103
" juvenile incont-		" subsequent treat-	
ence	390	ment of	104
" hæmaturia	437	Uric-acid calculi, reproduction of	247
" urinary fistula . .	172	" crystals	454
" recto-vesical " . .	175	" deposits	358, 454
" vesical tumour . .	419	" " history of sol-	
Triple phosphate	199	vents for	351
Triticum repens	378	" " treatment of . .	350
Trommer's test for diabetic urine	450	" " controllable by	
Tube-en-chemise	273	diet	341
Tumour-débris in urine		Urinary deposits, crystals and	
Tumours of the bladder	401	casts	454-460
" " diagnosis of .	416	" diseases, chiefly surgical	3
" " suprapubic		" " diagnosis of ob-	
operation for		scure. . . .	395
removing .	425	" fistula	169
" " cases of 405, 427		" fever	178
" " simple		Urine	12, 447, 452
polypoid .	411	" how to obtain a specimen .	12
		" cause of error in examining	12

	PAGE		PAGE
Urine in prostatitis	13	Vegetable diet	346
„ in cystitis	14	Venice turpentine	379
„ in stricture	11	Vesical incompetence, diagnosis .	385
„ in pyelitis	8	„ tumours, history and dia-	
„ retention of	129, 155	gnosis	411
„ in malignant disease of		„ „ treatment of	419
bladder	14	„ „ removal by high	
„ in Bright's disease	450	operation	425
„ in saccharine diabetes	451	„ „ forceps for	403
„ permanent suprapubic		„ „ cases of	427
opening for	151	Vichy water	326, 335, 443
„ extravasation of	166	Villous tumours of bladder	411
„ healthy	447	„ „ „ operation for	421
„ how to obtain proper speci-		Vulcanised indiarubber catheter	122
mens	452		
„ rules for examining	447	WALPOLE, Horace, case of	360
„ test by litmus paper	449	Washing out the bladder	373
„ specific gravity	449	Waters, mineral	331
„ examination of	13, 453	„ „ analysis of	332
„ microscopic examination	454	„ „ mode of administering	333
Uva ursi	142, 378	Weiss's fine catheters	72
		„ lithotrite	214
VALS water	326	Wholemeal bread	346
Varieties of calculus	197	Wine, suitable and unsuitable	342
Vegetable fungi	459	Women, lithotomy in	287





Catalogue B]

London, 11, New Burlington Street,
June, 1889.

S E L E C T I O N

FROM

J. & A. CHURCHILL'S GENERAL CATALOGUE

COMPRISING

ALL RECENT WORKS PUBLISHED BY THEM

ON THE

ART AND SCIENCE OF MEDICINE



N.B.—As far as possible, this List is arranged in the order in
which medical study is usually pursued.

J. & A. CHURCHILL publish for the following Institutions
and Public Bodies :—

ROYAL COLLEGE OF SURGEONS.

CATALOGUES OF THE MUSEUM.

Twenty-three separate Catalogues (List and Prices can be obtained of J. & A. CHURCHILL).

GUY'S HOSPITAL.

REPORTS BY THE MEDICAL AND SURGICAL STAFF.

Vol. XXX., Third Series. 7s. 6d.

FORMULE USED IN THE HOSPITAL IN ADDITION TO THOSE
IN THE B.P. 1s. 6d.

LONDON HOSPITAL.

PHARMACOPŒIA OF THE HOSPITAL. 3s.

ST. BARTHOLOMEW'S HOSPITAL.

CATALOGUE OF THE ANATOMICAL AND PATHOLOGICAL
MUSEUM. Vol. I.—Pathology. 15s. Vol. II.—Teratology, Anatomy
and Physiology, Botany. 7s. 6d.

ST. GEORGE'S HOSPITAL.

REPORTS BY THE MEDICAL AND SURGICAL STAFF.

The last Volume (X.) was issued in 1880. Price 7s. 6d.

CATALOGUE OF THE PATHOLOGICAL MUSEUM. 15s.

SUPPLEMENTARY CATALOGUE (1882). 5s.

ST. THOMAS'S HOSPITAL.

REPORTS BY THE MEDICAL AND SURGICAL STAFF

Annually. Vol. XVII., New Series. 7s. 6d.

MIDDLESEX HOSPITAL.

CATALOGUE OF THE PATHOLOGICAL MUSEUM. 12s.

WESTMINSTER HOSPITAL.

REPORTS BY THE MEDICAL AND SURGICAL STAFF.

Annually. Vol. IV. 6s.

ROYAL LONDON OPHTHALMIC HOSPITAL.

REPORTS BY THE MEDICAL AND SURGICAL STAFF.

Occasionally. Vol. XII., Part III. 5s.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

TRANSACTIONS. Vol. VIII. 12s. 6d.

MEDICO-PSYCHOLOGICAL ASSOCIATION.

JOURNAL OF MENTAL SCIENCE. Quarterly. 3s. 6d.

PHARMACEUTICAL SOCIETY OF GREAT BRITAIN.

PHARMACEUTICAL JOURNAL AND TRANSACTIONS.

Every Saturday. 4d. each, or 20s. per annum, post free.

BRITISH PHARMACEUTICAL CONFERENCE.

YEAR BOOK OF PHARMACY. 10s.

BRITISH DENTAL ASSOCIATION.

JOURNAL OF THE ASSOCIATION AND MONTHLY REVIEW
OF DENTAL SURGERY.

On the 15th of each Month. 6d. each, or 7s. per annum, post free.

A SELECTION

FROM

J. & A. CHURCHILL'S GENERAL CATALOGUE,

COMPRISING

ALL RECENT WORKS PUBLISHED BY THEM ON THE
ART AND SCIENCE OF MEDICINE.

N.B.—*J. & A. Churchill's Descriptive List of Works on Chemistry, Materia Medica, Pharmacy, Botany, Photography, Zoology, the Microscope, and other Branches of Science, can be had on application.*

Practical Anatomy :

A Manual of Dissections. By CHRISTOPHER HEATH, Surgeon to University College Hospital. Seventh Edition. Revised by RICKMAN J. GODLEE, M.S. Lond., F.R.C.S., Teacher of Operative Surgery, late Demonstrator of Anatomy in University College, and Surgeon to the Hospital. Crown 8vo, with 24 Coloured Plates and 278 Engravings, 15s.

Wilson's Anatomist's Vade-Mecum. Tenth Edition. By GEORGE BUCHANAN, Professor of Clinical Surgery in the University of Glasgow; and HENRY E. CLARK, M.R.C.S., Lecturer on Anatomy at the Glasgow Royal Infirmary School of Medicine. Crown 8vo, with 450 Engravings (including 26 Coloured Plates), 18s.

Braune's Atlas of Topographical Anatomy, after Plane Sections of Frozen Bodies. Translated by EDWARD BELLAMY, Surgeon to, and Lecturer on Anatomy, &c., at, Charing Cross Hospital. Large Imp. 8vo, with 34 Photolithographic Plates and 46 Woodcuts, 40s.

An Atlas of Human Anatomy. By RICKMAN J. GODLEE, M.S., F.R.C.S., Assistant Surgeon and Senior Demonstrator of Anatomy, University College Hospital. With 48 Imp. 4to Plates (112 figures), and a volume of Explanatory Text, 8vo, £4 14s. 6d.

Harvey's (Wm.) Manuscript Lectures. *Prelectiones Anatomiae Universalis.* Edited, with an Autotype reproduction of the Original, by a Committee of the Royal College of Physicians of London. Crown 4to, half bound in Persian, 52s. 6d.

Anatomy of the Joints of Man.

By HENRY MORRIS, Surgeon to, and Lecturer on Anatomy and Practical Surgery at, the Middlesex Hospital. 8vo, with 44 Lithographic Plates (several being coloured) and 13 Wood Engravings, 16s.

Manual of the Dissection of the

Human Body. By LUTHER HOLDEN, Consulting Surgeon to St. Bartholomew's Hospital. Edited by JOHN LANGTON, F.R.C.S., Surgeon to, and Lecturer on Anatomy at, St. Bartholomew's Hospital. Fifth Edition. 8vo, with 208 Engravings. 20s.

By the same Author.

Human Osteology.

Seventh Edition, edited by CHARLES STEWART, Conservator of the Museum R.C.S., and R.W. REID, M.D., F.R.C.S., Lecturer on Anatomy at St. Thomas's Hospital. 8vo, with 59 Lithographic Plates and 75 Engravings. 16s.

Also.

Landmarks, Medical and Surgical. Fourth Edition. 8vo, 3s. 6d.

The Student's Guide to Surgical

Anatomy. By EDWARD BELLAMY, F.R.C.S. and Member of the Board of Examiners. Third Edition. Fcap. 8vo, with 81 Engravings. 7s. 6d.

Diagrams of the Nerves of the

Human Body, exhibiting their Origin, Divisions, and Connections, with their Distribution to the Various Regions of the Cutaneous Surface, and to all the Muscles. By W. H. FLOWER, C.B., F.R.S., F.R.C.S. Third Edition, with 6 Plates. Royal 4to, 12s.

General Pathology :

An Introduction to. By JOHN BLAND SUTTON, F.R.C.S., Sir E. Wilson Lecturer on Pathology, R.C.S.; Assistant Surgeon to, and Lecturer on Anatomy at, Middlesex Hospital. 8vo, with 149 Engravings, 14s.

Atlas of Pathological Anatomy.

By Dr. LANCEREAUX. Translated by W. S. GREENFIELD, M.D., Professor of Pathology in the University of Edinburgh. Imp. 8vo, with 70 Coloured Plates, £5 5s.

A Manual of Pathological Anatomy.

By C. HANDFIELD JONES, M.B., F.R.S., and E. H. SIEVEKING, M.D., F.R.C.P. Edited by J. F. PAYNE, M.D., F.R.C.P., Lecturer on General Pathology at St. Thomas's Hospital. Second Edition. Crown 8vo, with 195 Engravings, 16s.

Post-mortem Examinations :

A Description and Explanation of the Method of Performing them, with especial reference to Medico-Legal Practice. By Prof. VIRCHOW. Translated by Dr. T. P. SMITH. Second Edition. Fcap. 8vo, with 4 Plates, 3s. 6d.

The Human Brain :

Histological and Coarse Methods of Research. A Manual for Students and Asylum Medical Officers. By W. BEVAN LEWIS, L.R.C.P. Lond., Medical Superintendent, West Riding Lunatic Asylum. 8vo, with Wood Engravings and Photographs, 8s.

Manual of Physiology :

For the use of Junior Students of Medicine. By GERALD F. YEO, M.D., F.R.C.S., F.R.S., Professor of Physiology in King's College, London. Second Edition. Crown 8vo, with 318 Engravings, 14s.

Principles of Human Physiology.

By W. B. CARPENTER, C.B., M.D., F.R.S. Ninth Edition. By HENRY POWER, M.B., F.R.C.S. 8vo, with 3 Steel Plates and 377 Wood Engravings, 31s. 6d.

Elementary Practical Biology :

Vegetable. By THOMAS W. SHORE, M.D., B.Sc. Lond., Lecturer on Comparative Anatomy at St. Bartholomew's Hospital. 8vo, 6s.

A Text-Book of Medical Physics,

for Students and Practitioners. By J. C. DRAPER, M.D., LL.D., Professor of Physics in the University of New York. With 377 Engravings. 8vo, 18s.

Medical Jurisprudence :

Its Principles and Practice. By ALFRED S. TAYLOR, M.D., F.R.C.P., F.R.S. Third Edition, by THOMAS STEVENSON, M.D., F.R.C.P., Lecturer on Medical Jurisprudence at Guy's Hospital. 2 vols. 8vo, with 188 Engravings, 31s. 6d.

By the same Authors.

A Manual of Medical Jurisprudence.

Eleventh Edition. Crown 8vo, with 56 Engravings, 14s.

Also.

Poisons,

In Relation to Medical Jurisprudence and Medicine. Third Edition. Crown 8vo, with 104 Engravings, 16s.

Lectures on Medical Jurisprudence.

By FRANCIS OGSTON, M.D., late Professor in the University of Aberdeen. Edited by FRANCIS OGSTON, Jun., M.D. 8vo, with 12 Copper Plates, 18s.

The Student's Guide to Medical Jurisprudence.

By JOHN ABERCROMBIE, M.D., F.R.C.P., Lecturer on Forensic Medicine to Charing Cross Hospital. Fcap. 8vo, 7s. 6d.

Microscopical Examination of

Drinking Water and of Air. By J. D. MACDONALD, M.D., F.R.S., Ex Professor of Naval Hygiene in the Army Medical School. Second Edition. 8vo, with 25 Plates, 7s. 6d.

Pay Hospitals and Paying Wards throughout the World.

By HENRY C. BURDETT. 8vo, 7s.

Hospitals, Infirmarys, and Dis-

pensaries: Their Construction, Interior Arrangement, and Management; with Descriptions of existing Institutions, and 74 Illustrations. By F. OPPERT, M.D., M.R.C.P.L. Second Edition. Royal 8vo, 12s.

Hospital Construction and

Management. By F. J. MOUAT, M.D., Local Government Board Inspector, and H. SAXON SNELL, Fell. Roy. Inst. Brit. Architects. Half calf, with large Map, 54 Lithographic Plates, and 27 Woodcuts, 35s.

Public Health Reports.

By Sir JOHN SIMON, C.B., F.R.S. Edited by EDWARD SEATON, M.D., F.R.C.P. 2 vols. 8vo, with Portrait, 36s.

Sanitary Examinations

Of Water, Air, and Food. A Vademecum for the Medical Officer of Health. By CORNELIUS B. FOX, M.D., F.R.C.P. Second Edition. Crown 8vo, with 110 Engravings, 12s. 6d.

A Manual of Practical Hygiene.

By E. A. PARKES, M.D., F.R.S. Seventh Edition, by F. DE CHAUMONT, M.D., F.R.S., Professor of Military Hygiene in the Army Medical School. 8vo, with 9 Plates and 101 Engravings, 18s.

A Handbook of Hygiene and Sanitary Science. By GEO. WILSON, M.A., M.D., F.R.S.E., Medical Officer of Health for Mid-Warwickshire. Sixth Edition. Crown 8vo, with Engravings. 10s. 6d.

By the same Author.

Healthy Life and Healthy Dwellings: A Guide to Personal and Domestic Hygiene. Fcap. 8vo, 5s.**Epidemic Influences:**

Epidemiological Aspects of Yellow Fever and of Cholera. The Milroy Lectures. By ROBERT LAWSON, LL.D., Inspector-General of Hospitals. 8vo, with Maps, Diagrams, &c., 6s.

Detection of Colour-Blindness and Imperfect Eyesight. By CHARLES ROBERTS, F.R.C.S. Second Edition. 8vo, with a Table of Coloured Wools, and Sheet of Test-types, 5s.**Illustrations of the Influence of the Mind upon the Body in Health and Disease:** Designed to elucidate the Action of the Imagination. By D. H. TUKE, M.D., F.R.C.P., LL.D. Second Edition. 2 vols. crown 8vo, 15s.

By the same Author.

Sleep-Walking and Hypnotism. 8vo, 5s.**A Manual of Psychological Medicine.** With an Appendix of Cases. By JOHN C. BUCKNILL, M.D., F.R.S., and D. HACK TUKE, M.D., F.R.C.P. Fourth Edition. 8vo, with 12 Plates (30 Figures) and Engravings, 25s.**Mental Affections of Childhood and Youth** (Lettsonian Lectures for 1887, &c.). By J. LANGDON DOWN, M.D., F.R.C.P., Senior Physician to the London Hospital. 8vo, 6s.**Mental Diseases:**

Clinical Lectures. By T. S. CLOUSTON, M.D., F.R.C.P. Edin., Lecturer on Mental Diseases in the University of Edinburgh. Second Edition. Crown 8vo, with 8 Plates (6 Coloured), 12s. 6d.

Intra-Uterine Death:

(Pathology of). Being the Lumleian Lectures, 1887. By WILLIAM O. PRIESTLEY, M.D., F.R.C.P., LL.D., Consulting Physician to King's College Hospital. 8vo, with 3 Coloured Plates and 17 Engravings, 7s. 6d.

Manual of Midwifery.

By ALFRED L. GALABIN, M.A., M.D., F.R.C.P., Obstetric Physician to, and Lecturer on Midwifery, &c. at, Guy's Hospital. Crown 8vo, with 227 Engravings, 15s.

The Student's Guide to the Practice of Midwifery. By D. LLOYD ROBERTS, M.D., F.R.C.P., Lecturer on Clinical Midwifery and Diseases of Women at the Owens College; Obstetric Physician to the Manchester Royal Infirmary. Third Edition. Fcap. 8vo, with 2 Coloured Plates and 127 Wood Engravings, 7s. 6d.**Lectures on Obstetric Operations:** Including the Treatment of Haemorrhage, and forming a Guide to the Management of Difficult Labour. By ROBERT BARNES, M.D., F.R.C.P., Consulting Obstetric Physician to St. George's Hospital. Fourth Edition. 8vo, with 121 Engravings, 12s. 6d.

By the same Author.

A Clinical History of Medical and Surgical Diseases of Women. Second Edition. 8vo, with 181 Engravings, 28s.**Clinical Lectures on Diseases of Women:** Delivered in St. Bartholomew's Hospital, by J. MATTHEWS DUNCAN, M.D., LL.D., F.R.S. Third Edition. 8vo, 16s.**The Female Pelvic Organs:**

Their Surgery, Surgical Pathology, and Surgical Anatomy. In a Series of Coloured Plates taken from Nature; with Commentaries, Notes, and Cases. By HENRY SAVAGE, M.D., F.R.C.S., Consulting Officer of the Samaritan Free Hospital. Fifth Edition. Roy. 4to, with 17 Lithographic Plates (15 coloured) and 52 Woodcuts, £1 15s.

Notes on Diseases of Women:

Specially designed to assist the Student in preparing for Examination. By J. J. REYNOLDS, L.R.C.P., M.R.C.S. Third Edition. Fcap. 8vo, 2s. 6d.

By the same Author.

Notes on Midwifery:

Specially designed for Students preparing for Examination. Second Edition. Fcap 8vo, with 15 Engravings, 4s.

A Manual of Obstetrics.

By A. F. A. KING, A.M., M.D., Professor of Obstetrics, &c., in the Columbian University, Washington, and the University of Vermont. Third Edition. Crown 8vo, with 102 Engravings, 8s.

The Student's Guide to the Diseases of Women. By ALFRED L. GALABIN, M.D., F.R.C.P., Obstetric Physician to Guy's Hospital. Fourth Edition. Fcap. 8vo, with 94 Engravings, 7s. 6d.

West on the Diseases of Women. Fourth Edition, revised by the Author, with numerous Additions by J. MATTHEWS DUNCAN, M.D., F.R.C.P., F.R.S.E., Obstetric Physician to St. Bartholomew's Hospital. 8vo, 16s.

Obstetric Aphorisms :

For the Use of Students commencing Midwifery Practice. By JOSEPH G. SWAYNE, M.D. Ninth Edition. Fcap. 8vo, with 17 Engravings, 3s. 6d.

Handbook of Midwifery for Midwives : By J. E. BURTON, L.R.C.P. Lond., Surgeon to the Hospital for Women, Liverpool. Second Edition. With Engravings. Fcap. 8vo, 6s.

A Handbook of Uterine Therapeutics, and of Diseases of Women. By E. J. TILT, M.D., M.R.C.P. Fourth Edition. Post 8vo, 10s.

By the same Author.

The Change of Life

In Health and Disease: A Clinical Treatise on the Diseases of the Nervous System incidental to Women at the Decline of Life. Fourth Edition. 8vo, 10s. 6d.

Diseases of the Uterus, Ovaries, and Fallopian Tubes: A Practical Treatise by A. COURTY, Professor of Clinical Surgery, Montpellier. Translated from Third Edition by his Pupil, AGNES McLAREN, M.D., M.K.Q.C.P.I., with Preface by J. MATTHEWS DUNCAN, M.D., F.R.C.P. 8vo, with 424 Engravings, 24s.

Gynæcological Operations :

(Handbook of). By ALBAN H. G. DORAN, F.R.C.S., Surgeon to the Samaritan Hospital. 8vo, with 167 Engravings, 15s.

Diseases and Accidents

Incident to Women, and the Practice of Medicine and Surgery applied to them. By W. H. BYFORD, A.M., M.D., Professor of Gynæcology in Rush Medical College, and HENRY T. BYFORD, M.D., Surgeon to the Woman's Hospital, Chicago. Fourth Edition. 8vo, with 306 Engravings, 25s.

A Practical Treatise on the Diseases of Women. By T. GAILLARD THOMAS, M.D., Professor of Diseases of Women in the College of Physicians and Surgeons, New York. Fifth Edition. Roy. 8vo, with 266 Engravings, 25s.

Abdominal Surgery.

By J. GREIG SMITH, M.A., F.R.S.E., Surgeon to the Bristol Royal Infirmary and Lecturer on Surgery in the Bristol Medical School. Second Edition. 8vo, with 79 Engravings, 21s.

The Student's Guide to Diseases of Children. By JAS. F. GOODHART, M.D., F.R.C.P., Physician to Guy's Hospital, and to the Evelina Hospital for Sick Children. Third Edition. Fcap. 8vo, 10s. 6d.

Diseases of Children.

For Practitioners and Students. By W. H. DAY, M.D., Physician to the Samaritan Hospital. Second Edition. Crown 8vo, 12s. 6d.

A Practical Treatise on Disease in Children. By EUSTACE SMITH, M.D., Physician to the King of the Belgians, Physician to the East London Hospital for Children. 8vo, 22s.

By the same Author.

Clinical Studies of Disease in Children. Second Edition. Post 8vo, 7s. 6d. *Also.*

The Wasting Diseases of Infants and Children. Fifth Edition. Post 8vo, 8s. 6d.

A Practical Manual of the Diseases of Children. With a Formula. By EDWARD ELLIS, M.D. Fifth Edition. Crown 8vo, 10s.

A Manual for Hospital Nurses and others engaged in Attending on the Sick, and a Glossary. By EDWARD J. DOMVILLE, Surgeon to the Exeter Lying-in Charity. Sixth Edition. Cr. 8vo, 2s. 6d.

A Manual of Nursing, Medical and Surgical. By CHARLES J. CULLINGWORTH, M.D., Obstetric Physician to St. Thomas's Hospital. Second Edition. Fcap. 8vo, with Engravings, 3s. 6d.

By the same Author.

A Short Manual for Monthly Nurses. Second Edition. Fcap. 8vo, 1s. 6d.

Hospital Sisters and their Duties. By EVA C. E. LÜCKES, Matron to the London Hospital. Second Edition. Crown 8vo, 2s. 6d.

Diseases and their Commencement. Lectures to Trained Nurses. By DONALD W. C. HOOD, M.D., M.R.C.P., Physician to the West London Hospital. Crown 8vo, 2s. 6d.

Infant Feeding and its Influence on Life. By C. H. F. ROUTH, M.D., Physician to the Samaritan Hospital. Fourth Edition. Fcap. 8vo. [*Preparing.*]

Manual of Botany :

Including the Structure, Classification, Properties, Uses, and Functions of Plants. By ROBERT BENTLEY, Professor of Botany in King's College and to the Pharmaceutical Society. Fifth Edition. Crown 8vo, with 1,178 Engravings, 15s.

By the same Author.

The Student's Guide to Structural, Morphological, and Physiological Botany. With 660 Engravings. Fcap. 8vo, 7s. 6d.

Also.

The Student's Guide to Systematic Botany, including the Classification of Plants and Descriptive Botany. Fcap. 8vo, with 350 Engravings, 3s. 6d.**Medicinal Plants :**

Being descriptions, with original figures, of the Principal Plants employed in Medicine, and an account of their Properties and Uses. By Prof. BENTLEY and Dr. H. TRIMEN, F.R.S. In 4 vols., large 8vo, with 306 Coloured Plates, bound in Half Morocco, Gilt Edges, £11 11s.

Outlines of Infectious Diseases :

For the use of Clinical Students. By J. W. ALLAN, M.B., Physician Superintendent Glasgow Fever Hospital. Fcap. 8vo., 3s.

Materia Medica.

A Manual for the use of Students. By ISAMBARD OWEN, M.D., F.R.C.P., Lecturer on Materia Medica, &c., to St. George's Hospital. Second Edition. Crown 8vo, 6s. 6d.

The Prescriber's Pharmacopœia:

The Medicines arranged in Classes according to their Action, with their Composition and Doses. By NESTOR J. C. TIRARD, M.D., F.R.C.P., Professor of Materia Medica and Therapeutics in King's College, London. Sixth Edition. 32mo, bound in leather, 3s.

Royle's Manual of Materia

Medica and Therapeutics. Sixth Edition, including additions and alterations in the B.P. 1885. By JOHN HARLEY, M.D., Physician to St. Thomas's Hospital. Crown 8vo, with 139 Engravings, 15s.

Materia Medica and Therapeutics :

Vegetable Kingdom — Organic Compounds — Animal Kingdom. By CHARLES D. F. PHILLIPS, M.D., F.R.S. Edin., late Lecturer on Materia Medica and Therapeutics at the Westminster Hospital Medical School. 8vo, 25s.

The Student's Guide to Materia

Medica and Therapeutics. By JOHN C. THOROWGOOD, M.D., F.R.C.P. Second Edition. Fcap. 8vo, 7s.

A Companion to the British Pharmacopœia. By PETER SQUIRE, Revised by his Sons, P. W. and A. H. SQUIRE. 14th Edition. 8vo, 10s. 6d.

By the same Authors.

The Pharmacopœias of the London Hospitals, arranged in Groups for Easy Reference and Comparison. Fifth Edition 18mo, 6s.**A Treatise on the Principles and Practice of Medicine.** Sixth Edition. By AUSTIN FLINT, M.D., W. H. WELCH, M.D., and AUSTIN FLINT, jun., M.D. 8vo, with Engravings, 26s.**Climate and Fevers of India,** with a series of Cases (Croonian Lectures, 1882). By Sir JOSEPH FAYRER, K.C.S.I., M.D. 8vo, with 17 Temperature Charts, 12s.

By the same Author.

The Natural History and Epidemiology of Cholera : Being the Annual Oration of the Medical Society of London, 1888. 8vo, 3s. 6d.**Family Medicine and Hygiene**

for India. A Manual. By Sir WILLIAM J. MOORE, M.D., K.C.I.E., late Surgeon-General with the Government of Bombay. Published under the Authority of the Government of India. Fifth Edition. Post 8vo, with 71 Engravings, 12s.

By the same Author.

A Manual of the Diseases of India : With a Compendium of Diseases generally. Second Edition. Post 8vo, 10s.**The Prevention of Disease in Tropical and Sub-Tropical Campaigns.** (Parkes Memorial Prize for 1886.) By ANDREW DUNCAN, M.D., B.S. Lond., F.R.C.S., Surgeon, Bengal Army. 8vo, 12s. 6d.**Practical Therapeutics :**

A Manual. By EDWARD J. WARING, C.I.E., M.D., F.R.C.P., and DUDLEY W. BUXTON, M.D., B.S. Lond. Fourth Edition. Crown 8vo, 14s.

By the same Author.

Bazaar Medicines of India,

And Common Medical Plants : With Full Index of Diseases, indicating their Treatment by these and other Agents procurable throughout India, &c. Fourth Edition Fcap. 8vo, 5s.

A Commentary on the Diseases of India. By NORMAN CHEVERS, C.I.E., M.D., F.R.C.S., Deputy Surgeon-General H.M. Indian Army. 8vo, 24s.

The Principles and Practice of Medicine. By C. HILTON FAGGE, M.D. Second Edition. Edited by P. H. PYE-SMITH, M.D., F.R.S., F.R.C.P., Physician to, and Lecturer on Medicine in, Guy's Hospital. 2 vols. 8vo. Cloth, 38s.; Half Leather, 44s.

The Student's Guide to the Practice of Medicine. By M. CHARTERIS, M.D., Professor of Therapeutics and Materia Medica in the University of Glasgow. Fifth Edition. Fcap. 8vo, with Engravings on Copper and Wood, 9s.

Hooper's Physicians' Vade-Mecum. A Manual of the Principles and Practice of Physic. Tenth Edition. By W. A. GUY, F.R.C.P., F.R.S., and J. HARLEY, M.D., F.R.C.P. With 118 Engravings. Fcap. 8vo, 12s. 6d.

Preventive Medicine.

Collected Essays. By WILLIAM SQUIRE, M.D., F.R.C.P., Physician to St. George, Hanover-square, Dispensary. 8vo, 6s. 6d.

The Student's Guide to Clinical Medicine and Case-Taking. By FRANCIS WARNER, M.D., F.R.C.P., Physician to the London Hospital. Second Edition. Fcap. 8vo, 5s.

An Atlas of the Pathological Anatomy of the Lungs. By the late WILSON FOX, F.R.C.P., Physician to H.M. the Queen. With 45 Plates (mostly Coloured) and Engravings. 4to, half-bound in Calf, 70s.

The Bronchi and Pulmonary Blood-vessels: their Anatomy and Nomenclature. By WILLIAM EWART, M.D., F.R.C.P., Physician to St. George's Hospital. 4to, with 20 Illustrations, 21s.

The Student's Guide to Diseases of the Chest. By VINCENT D. HARRIS, M.D. Lond., F.R.C.P., Physician to the City of London Hospital for Diseases of the Chest, Victoria Park. Fcap. 8vo, with 55 Illustrations (some Coloured), 7s. 6d.

How to Examine the Chest:

A Practical Guide for the use of Students. By SAMUEL WEST, M.D., F.R.C.P., Physician to the City of London Hospital for Diseases of the Chest; Assistant Physician to St. Bartholomew's Hospital. With 42 Engravings. Fcap. 8vo, 5s.

Contributions to Clinical and Practical Medicine. By A. T. HOUGHTON WATERS, M.D., Physician to the Liverpool Royal Infirmary. 8vo, with Engravings, 7s.

Fever: A Clinical Study.

By T. J. MACLAGAN, M.D. 8vo, 7s. 6d.

The Student's Guide to Medical Diagnosis. By SAMUEL FENWICK, M.D., F.R.C.P., Physician to the London Hospital, and BEDFORD FENWICK, M.D., M.R.C.P. Sixth Edition. Fcap. 8vo, with 114 Engravings, 7s.

By the same Author.

The Student's Outlines of Medical Treatment. Second Edition. Fcap. 8vo, 7s.

Also.

On Chronic Atrophy of the Stomach, and on the Nervous Affections of the Digestive Organs. 8vo, 8s.

Also.

The Saliva as a Test for Functional Diseases of the Liver. Crown 8vo, 2s.

The Microscope in Medicine.

By LIONEL S. BEALE, M.B., F.R.S., Physician to King's College Hospital. Fourth Edition. 8vo, with 86 Plates, 21s.

Also.

On Slight Ailments:

Their Nature and Treatment. Second Edition. 8vo, 5s.

Medical Lectures and Essays.

By G. JOHNSON, M.D., F.R.C.P., F.R.S., Consulting Physician to King's College Hospital. 8vo, with 46 Engravings, 25s.

By the same Author.

An Essay on Asphyxia (Apnœa). 8vo, 3s.

Winter Cough

(Catarrh, Bronchitis, Emphysema, Asthma). By HORACE DOBELL, M.D., Consulting Physician to the Royal Hospital for Diseases of the Chest. Third Edition. 8vo, with Coloured Plates, 10s. 6d.

By the same Author.

Loss of Weight, Blood-Spitting, and Lung Disease. Second Edition. 8vo, with Chromo-lithograph, 10s. 6d.

Also.

The Mont Dore Cure, and the Proper Way to Use it. 8vo, 7s. 6d.

Vaccinia and Variola:

A Study of their Life History. By JOHN B. BUIST, M.D., F.R.S.E., Teacher of Vaccination for the Local Government Board. Crown 8vo, with 24 Coloured Plates, 7s. 6d.

Treatment of Some of the Forms of Valvular Disease of the Heart.

By A. E. SANSOM, M.D., F.R.C.P., Physician to the London Hospital. Second Edition. Fcap. 8vo, with 26 Engravings, 4s. 6d.

Diseases of the Heart and Aorta :

Clinical Lectures. By G. W. BALFOUR, M.D., F.R.C.P., F.R.S. Edin., late Senior Physician and Lecturer on Clinical Medicine, Royal Infirmary, Edinburgh. Second Edition. 8vo, with Chromo-lithograph and Wood Engravings, 12s. 6d.

Notes on Asthma :

Its Forms and Treatment. By JOHN C. THOROWGOOD, M.D., Physician to the Hospital for Diseases of the Chest Third Edition. Crown 8vo, 4s. 6d.

Medical Ophthalmoscopy :

A Manual and Atlas. By W. R. GOWERS, M.D., F.R.C.P., F.R.S., Physician to the National Hospital for the Paralyzed and Epileptic. Second Edition, with Coloured Plates and Woodcuts. 8vo, 18s.

By the same Author.

Diagnosis of Diseases of the Brain. Second Edition. 8vo, with Engravings, 7s. 6d.

Also.

Diagnosis of Diseases of the Spinal Cord. Third Edition. 8vo, with Engravings, 4s. 6d.

Also.

A Manual of Diseases of the Nervous System.

Vol. I. Diseases of the Spinal Cord and Nerves. Roy. 8vo, with 171 Engravings (many figures), 12s. 6d.

Vol. II. Diseases of the Brain and Cranial Nerves : General and Functional Diseases of the Nervous System. 8vo, with 170 Engravings, 17s. 6d.

Diseases of the Nervous System.

Lectures delivered at Guy's Hospital. By SAMUEL WILKS, M.D., F.R.S. Second Edition. 8vo, 18s.

Gout in its Clinical Aspects.

By J. MORTIMER GRANVILLE, M.D. Crown 8vo, 6s.

Regimen to be adopted in Cases

of Gout. By WILHELM EBSTEIN, M.D., Professor of Clinical Medicine in Göttingen. Translated by JOHN SCOTT, M.A., M.B. 8vo, 2s. 6d.

Diseases of the Nervous System.

Clinical Lectures. By THOMAS BUZZARD, M.D., F.R.C.P., Physician to the National Hospital for the Paralyzed and Epileptic. With Engravings, 8vo. 15s.

By the same Author.

Some Forms of Paralysis from Peripheral Neuritis: of Gouty, Alcoholic, Diphtheritic, and other origin. Crown 8vo, 5s.

Diseases of the Liver :

With and without Jaundice. By GEORGE HARLEY, M.D., F.R.C.P., F.R.S. 8vo, with 2 Plates and 36 Engravings, 21s.

By the same Author.

Inflammations of the Liver, and their Sequelæ. Crown 8vo, with Engravings, 5s.

Gout, Rheumatism,

And the Allied Affections ; with Chapters on Longevity and Sleep. By PETER HOOD, M.D. Third Edition. Crown 8vo, 7s. 6d.

Diseases of the Stomach :

The Varieties of Dyspepsia, their Diagnosis and Treatment. By S. O. HABERSHON, M.D., F.R.C.P. Third Edition. Crown 8vo, 5s.

By the same Author.

Pathology of the Pneumo-gastric Nerve : Lumleian Lectures for 1876. Second Edition. Post 8vo, 4s.

Also.

Diseases of the Abdomen,

Comprising those of the Stomach and other parts of the Alimentary Canal, Oesophagus, Cæcum, Intestines, and Peritoneum. Fourth Edition. 8vo, with 5 Plates, 21s.

Also.

Diseases of the Liver,

Their Pathology and Treatment. Lettsomian Lectures. Second Edition. Post 8vo, 4s.

On the Relief of Excessive and Dangerous Tympanites by Puncture of the Abdomen.

By JOHN W. OGLE, M.A., M.D., F.R.C.P., Consulting Physician to St. George's Hospital. 8vo, 5s. 6d.

Acute Intestinal Strangulation,

And Chronic Intestinal Obstruction (Mode of Death from). By THOMAS BRYANT, F.R.C.S., Senior Surgeon to Guy's Hospital. 8vo, 3s.

Handbook of the Diseases of the Nervous System. By JAMES ROSS, M.D., F.R.C.P., Assistant Physician to the Manchester Royal Infirmary. Roy. 8vo, with 184 Engravings, 18s.

Also.

Aphasia :

Being a Contribution to the Subject of the Dissolution of Speech from Cerebral Disease. 8vo, with Engravings, 4s. 6d.

Food and Dietetics,

Physiologically and Therapeutically Considered. By F. W. PAVY, M.D., F.R.S., Physician to Guy's Hospital. Second Edition. 8vo, 15s.

By the same Author.

Croonian Lectures on Certain

Points connected with Diabetes. 8vo, 4s. 6d.

Headaches :

Their Nature, Causes, and Treatment. By W. H. DAY, M.D., Physician to the Samaritan Hospital. Fourth Edition. Crown 8vo, with Engravings, 7s. 6d.

Health Resorts at Home and

Abroad. By M. CHARTERIS, M.D., Professor of Therapeutics and Materia Medica in the University of Glasgow. Second Edition. Crown 8vo, with Map, 5s. 6d.

Winter and Spring

On the Shores of the Mediterranean. By HENRY BENNET, M.D. Fifth Edition. Post 8vo, with numerous Plates, Maps, and Engravings, 12s. 6d.

Medical Guide to the Mineral

Waters of France and its Wintering Stations. With a Special Map. By A. VINTRAS, M.D., Physician to the French Embassy, and to the French Hospital, London. Crown 8vo, 8s.

The Ocean as a Health-Resort :

A Practical Handbook of the Sea, for the use of Tourists and Health-Seekers. By WILLIAM S. WILSON, L.R.C.P. Second Edition, with Chart of Ocean Routes, &c. Crown 8vo, 7s. 6d.

Ambulance Handbook for Volun-

teers and Others. By J. ARDAVON RAYE, L.K. & Q.C.P.I., L.R.C.S.I., late Surgeon to H.B.M. Transport No. 14, Zulu Campaign, and Surgeon E.I.R. Rifles. 8vo, with 16 Plates (50 figures), 3s. 6d.

Anatomy Lectures :

To which is added a NURSING LECTURE. By JOHN M. H. MARTIN, Honorary Surgeon to the Blackburn Infirmary. Second Edition. Crown 8vo, with 59 Engravings, 2s.

Commoner Diseases and Acci-

dents to Life and Limb: their Prevention and Immediate Treatment. By M. M. BASIL, M.A., M.B., C.M. Crown 8vo, 2s. 6d.

How to Use a Galvanic Battery

in Medicine and Surgery. By HERBERT TIBBITS, M.D., F.R.C.P.E., Senior Physician to the West London Hospital for Paralysis and Epilepsy. Third Edition. 8vo, with Engravings, 4s.

By the same Author.

A Map of Ziemssen's Motor

Points of the Human Body: A Guide to Localised Electrification. Mounted on Rollers, 35 x 21. With 20 Illustrations, 5s.

Also.

Electrical and Anatomical De-

monstrations. A Handbook for Trained Nurses and Masseuses. Crown 8vo, with 44 Illustrations, 5s.

Surgical Emergencies :

Together with the Emergencies attendant on Parturition and the Treatment of Poisoning. By W. PAUL SWAIN, F.R.C.S., Surgeon to the South Devon and East Cornwall Hospital. Fourth Edition. Crown 8vo, with 120 Engravings, 5s.

Operative Surgery in the Cal-

cutta Medical College Hospital. Statistics, Cases, and Comments. By KENNETH MCLEOD, A.M., M.D., F.R.C.S.E., Surgeon-Major, Indian Medical Service, Professor of Surgery in Calcutta Medical College. 8vo, with Illustrations, 12s. 6d.

A Course of Operative Surgery.

By CHRISTOPHER HEATH, Surgeon to University College Hospital. Second Edition. With 20 coloured Plates (180 figures) from Nature, by M. LÉVEILLÉ, and several Woodcuts. Large 8vo, 30s.

By the same Author.

The Student's Guide to Surgical

Diagnosis. Second Edition. Fcap. 8vo, 6s. 6d.

Also.

Manual of Minor Surgery and

Bandaging. For the use of House-Surgeons, Dressers, and Junior Practitioners. Eighth Edition. Fcap. 8vo, with 142 Engravings, 6s.

Also.

Injuries and Diseases of the

Jaws. Third Edition. 8vo, with Plate and 206 Wood Engravings, 14s.

Also,

Lectures on Certain Diseases

of the Jaws. Delivered at the R.C.S., Eng., 1887. 8vo, with 64 Engravings, 2s. 6d.

The Practice of Surgery :

A Manual. By THOMAS BRYANT, Consulting Surgeon to Guy's Hospital. Fourth Edition. 2 vols. crown 8vo, with 750 Engravings (many being coloured), and including 6 chromo plates, 32s.

By the same Author.

On Tension : Inflammation of Bone, and Head Injuries.

Hunterian Lectures, 1888. 8vo, 6s.

Surgery: its Theory and Practice (Student's Guide).

By WILLIAM J. WALSHAM, F.R.C.S., Assistant Surgeon to St. Bartholomew's Hospital. Second Edition. Fcap. 8vo, with 294 Engravings, 10s. 6d.

The Surgeon's Vade-Mecum :

A Manual of Modern Surgery. By R. DRUITT, F.R.C.S. Twelfth Edition. By STANLEY BOYD, M.B., F.R.C.S. Assistant Surgeon and Pathologist to Charing Cross Hospital. Crown 8vo, with 373 Engravings 16s.

The Operations of Surgery :

Intended for Use on the Dead and Living Subject alike. By W. H. A. JACOBSON, M.A., M.B., M.Ch. Oxon., F.R.C.S., Assistant Surgeon to Guy's Hospital, and Teacher of Surgery in the Medical School. 8vo, with 200 Illustrations, 30s.

Regional Surgery :

Including Surgical Diagnosis. A Manual for the use of Students. By F. A. SOUTHAM, M.A., M.B., F.R.C.S., Assistant Surgeon to the Manchester Royal Infirmary. Part I. The Head and Neck. Crown 8vo, 6s. 6d. — Part II. The Upper Extremity and Thorax. Crown 8vo, 7s. 6d. Part III. The Abdomen and Lower Extremity. Crown 8vo, 7s.

A Treatise on Dislocations.

By LEWIS A. STIMSON, M.D., Professor of Clinical Surgery in the University of the City of New York. Roy. 8vo, with 163 Engravings, 15s.

By the same Author.

A Treatise on Fractures.

Roy. 8vo, with 360 Engravings, 21s.

Lectures on Orthopædic Surgery.

By BERNARD E. BRODHURST, F.R.C.S., Surgeon to the Royal Orthopædic Hospital. Second Edition. 8vo, with Engravings, 12s. 6d.

By the same Author.

On Anchylosis, and the Treatment for the Removal of Deformity and the Restoration of Mobility in Various Joints.

Fourth Edition. 8vo, with Engravings, 5s.

Also.

Curvatures and Disease of the Spine.

Fourth Edition. 8vo, with Engravings, 7s. 6d.

Surgical Pathology and Morbid Anatomy (Student's Guide).

By ANTHONY A. BOWLBY, F.R.C.S., Surgical Registrar and Demonstrator of Surgical Pathology to St. Bartholomew's Hospital. Fcap. 8vo, with 135 Engravings, 9s.

Illustrations of Clinical Surgery

By JONATHAN HUTCHINSON, F.R.S. Senior Surgeon to the London Hospital. In fasciculi. 6s. 6d each. Fasc. I. to X. bound, with Appendix and Index, £3 10s. Fasc. XI. to XXIII. bound, with Index, £4 10s.

Diseases of Bones and Joints.

By CHARLES MACNAMARA, F.R.C.S., Surgeon to, and Lecturer on Surgery at, the Westminster Hospital. 8vo, with Plates and Engravings, 12s.

Injuries of the Spine and Spinal Cord, and NERVOUS SHOCK,

in their Surgical and Medico-Legal Aspects. By HERBERT W. PAGE, M.C. Cantab., F.R.C.S., Surgeon to St. Mary's Hospital. Second Edition, post 8vo, 10s.

Spina Bifida :

Its Treatment by a New Method. By JAS. MORTON, M.D., L.R.C.S.E., Professor of Materia Medica in Anderson's College, Glasgow. 8vo, with Plates, 7s. 6d.

Face and Foot Deformities.

By FREDERICK CHURCHILL, C.M., Surgeon to the Victoria Hospital for Children. 8vo, with Plates and Illustrations, 10s. 6d.

Clubfoot :

Its Causes, Pathology, and Treatment. By WM. ADAMS, F.R.C.S., Surgeon to the Great Northern Hospital. Second Edition. 8vo, with 106 Engravings and 6 Lithographic Plates, 15s.

By the same Author.

Lateral and other Forms of

Curvature of the Spine: Their Pathology and Treatment. Second Edition. 8vo, with 5 Lithographic Plates and 72 Wood Engravings, 10s. 6d.

Electricity and its Manner of

Working in the Treatment of Disease. By WM. E. STEAVENSON, M.D., Physician and Electrician to St. Bartholomew's Hospital. 8vo, 4s. 6d.

On Diseases and Injuries of the

Eye: A Course of Systematic and Clinical Lectures to Students and Medical Practitioners. By J. R. WOLFE, M.D., F.R.C.S.E., Lecturer on Ophthalmic Medicine and Surgery in Anderson's College, Glasgow. With 10 Coloured Plates and 157 Wood Engravings. 8vo, £1 1s.

Hints on Ophthalmic Out-Patient

Practice. By CHARLES HIGGENS, Ophthalmic Surgeon to Guy's Hospital. Third Edition. Fcap. 8vo, 3s.

The Student's Guide to Diseases of the Eye. By EDWARD NETTLESHIP, F.R.C.S., Ophthalmic Surgeon to St. Thomas's Hospital. Fourth Edition. Fcap. 8vo, with 164 Engravings and a Set of Coloured Papers illustrating Colour-Blindness, 7s. 6d.

Manual of the Diseases of the Eye. By CHARLES MACNAMARA, F.R.C.S., Surgeon to Westminster Hospital. Fourth Edition. Crown 8vo, with 4 Coloured Plates and 66 Engravings, 10s. 6d.

Normal and Pathological Histology of the Human Eye and Eyelids. By C. FRED. POLLOCK, M.D., F.R.C.S. and F.R.S.E., Surgeon for Diseases of the Eye to Anderson's College Dispensary, Glasgow. Crown 8vo, with 100 Plates (230 drawings), 15s.

Atlas of Ophthalmoscopy.

Composed of 12 Chromo-lithographic Plates (59 Figures drawn from nature) and Explanatory Text. By RICHARD LIEBREICH, M.R.C.S. Translated by H. ROSBOROUGH SWANZY, M.B. Third edition, 4to, 40s.

Refraction of the Eye :

A Manual for Students. By GUSTAVUS HARTRIDGE, F.R.C.S., Surgeon to the Royal Westminster Ophthalmic Hospital. Third Edition. Crown 8vo, with 96 Illustrations, Test-types, &c., 5s. 6d.

Squint :

(Clinical Investigations on). By C. SCHWEIGER, M.D., Professor of Ophthalmology in the University of Berlin. Edited by GUSTAVUS HARTRIDGE, F.R.C.S. 8vo, 5s.

Practitioner's Handbook of Diseases of the Ear and Naso-Pharynx. By H. MACNAUGHTON JONES, M.D., late Professor of the Queen's University in Ireland, Surgeon to the Cork Ophthalmic and Aural Hospital. Third Edition of "Aural Surgery." Roy. 8vo, with 128 Engravings, 6s.

By the same Author.

Atlas of Diseases of the Membrana Tympani. In Coloured Plates, containing 62 Figures, with Text. Crown 4to, 21s.

Endemic Goitre or Thyreocoele :

Its Etiology, Clinical Characters, Pathology, Distribution, Relations to Cretinism, Myxœdema, &c., and Treatment. By WILLIAM ROBINSON, M.D. 8vo, 5s.

Diseases and Injuries of the Ear. By Sir WILLIAM B. DALBY, Aural Surgeon to St. George's Hospital. Third Edition. Crown 8vo, with Engravings, 7s. 6d.

By the Same Author.

Short Contributions to Aural Surgery, between 1875 and 1886. 8vo, with Engravings, 3s. 6d.

Diphtheria :

Its Nature and Treatment, Varieties, and Local Expressions. By Sir MORELL MACKENZIE, M.D., Senior Physician to the Hospital for Diseases of the Throat. 8vo, 5s.

Sore Throat :

Its Nature, Varieties, and Treatment. By PROSSER JAMES, M.D., Physician to the Hospital for Diseases of the Throat. Fifth Edition. Post 8vo, with Coloured Plates and Engravings, 6s. 6d.

Studies in Pathological Anatomy,

Especially in Relation to Laryngeal Neoplasms. By R. NORRIS WOLFENDEN, M.D., Senior Physician to the Throat Hospital, and SIDNEY MARTIN, M.D., Pathologist to the City of London Hospital, Victoria Park. I. Papilloma. Roy. 8vo, with Coloured Plates, 2s. 6d.

A System of Dental Surgery.

By Sir JOHN TOMES, F.R.S., and C. S. TOMES, M.A., F.R.S. Third Edition. Crown 8vo, with 292 Engravings, 15s.

Dental Anatomy, Human and

Comparative: A Manual. By CHARLES S. TOMES, M.A., F.R.S. Second Edition. Crown 8vo, with 191 Engravings, 12s. 6d.

The Student's Guide to Dental

Anatomy and Surgery. By HENRY SEWILL, M.R.C.S., L.D.S. Second Edition. Fcap. 8vo, with 78 Engravings, 5s. 6d.

A Manual of Nitrous Oxide

Anæsthesia, for the use of Students and General Practitioners. By J. FREDERICK W. SILK, M.D. Lond., M.R.C.S., Anæsthetist to the Great Northern Central Hospital, and to the National Dental Hospital. 8vo, with 26 Engravings, 5s.

Mechanical Dentistry in Gold

and Vulcanite. By F. H. BALKWILL, L.D.S.R.C.S. 8vo, with 2 Lithographic Plates and 57 Engravings, 10s.

Principles and Practice of Dentistry : including Anatomy, Physiology, Pathology, Therapeutics, Dental Surgery, and Mechanism. By C. A. HARRIS, M.D., D.D.S. Edited by F. J. S. GORGAS, A.M., M.D., D.D.S., Professor in the Dental Department of Maryland University. Twelfth Edition. 8vo, with over 1,000 Illustrations, 33s.

A Practical Treatise on Mechanical Dentistry. By JOSEPH RICHARDSON, M.D., D.D.S., late Emeritus Professor of Prosthetic Dentistry in the Indiana Medical College. Fourth Edition. Roy. 8vo, with 458 Engravings, 21s.

Elements of Dental Materia Medica and Therapeutics, with Pharmacopœia. By JAMES STOCKEN, L.D.S.R.C.S., Pereira Prizeman for Materia Medica, and THOMAS GADDES, L.D.S. Eng. and Edin. Third Edition. Fcap. 8vo, 7s. 6d.

Papers on Dermatology.

By E. D. MAPOTHER, M.D., Ex-Pres. R.C.S.I. 8vo, 3s. 6d.

Atlas of Skin Diseases.

By TILBURY FOX, M.D., F.R.C.P. With 72 Coloured Plates. Royal 4to, half morocco, £6 6s.

Diseases of the Skin :

With an Analysis of 8,000 Consecutive Cases and a Formulary. By L. D. BULKLEY, M.D., Physician for Skin Diseases at the New York Hospital. Crown 8vo, 6s. 6d.

By the same Author.

Acne : its Etiology, Pathology, and Treatment : Based upon a Study of 1,500 Cases. 8vo, with Engravings, 10s.

On Certain Rare Diseases of the Skin. By JONATHAN HUTCHINSON, F.R.S., Senior Surgeon to the London Hospital, and to the Hospital for Diseases of the Skin. 8vo, 10s. 6d.

Diseases of the Skin :

A Practical Treatise for the Use of Students and Practitioners. By J. N. HYDE, A.M., M.D., Professor of Skin and Venereal Diseases, Rush Medical College, Chicago. Second Edition. 8vo, with 2 Coloured Plates and 96 Engravings, 20s.

Leprosy in British Guiana.

By JOHN D. HILLIS, F.R.C.S., M.R.I.A., Medical Superintendent of the Leper Asylum, British Guiana. Imp. 8vo, with 22 Lithographic Coloured Plates and Wood Engravings, £1 11s. 6d.

On Cancer :

Its Allies, and other Tumours ; their Medical and Surgical Treatment. By F. A. PURCELL, M.D., M.C., Surgeon to the Cancer Hospital, Brompton. 8vo, with 21 Engravings, 10s. 6d.

Sarcoma and Carcinoma :

Their Pathology, Diagnosis, and Treatment. By HENRY T. BUTLIN, F.R.C.S., Assistant Surgeon to St. Bartholomew's Hospital. 8vo, with 4 Plates, 8s.

By the same Author.

Malignant Disease of the Larynx (Sarcoma and Carcinoma). 8vo, with 5 Engravings, 5s.

Also.

Operative Surgery of Malignant Disease. 8vo, 14s.

Cancerous Affections of the Skin.

(Epithelioma and Rodent Ulcer.) By GEORGE THIN, M.D. Post 8vo, with 8 Engravings, 5s.

By the same Author.

Pathology and Treatment of Ringworm. 8vo, with 21 Engravings, 5s.

Cancer of the Mouth, Tongue, and Alimentary Tract : their Pathology, Symptoms, Diagnosis, and Treatment. By FREDERIC B. JESSETT, F.R.C.S., Surgeon to the Cancer Hospital, Brompton. 8vo, 10s.

Clinical Chemistry of Urine (Outlines of the). By C. A. MACMUNN, M.A., M.D. 8vo, with 70 Engravings. [*Nearly Ready.*]

Lectures on the Surgical Disorders of the Urinary Organs. By REGINALD HARRISON, F.R.C.S., Surgeon to the Liverpool Royal Infirmary. Third Edition, with 117 Engravings. 8vo, 12s. 6d.

Hydrocele :

Its several Varieties and their Treatment. By SAMUEL OSBORN, late Surgical Registrar to St. Thomas's Hospital. Fcap. 8vo, with Engravings, 3s.

By the same Author.

Diseases of the Testis.

Fcap. 8vo, with Engravings, 3s. 6d.

Diseases of the Urinary Organs.

Clinical Lectures. By Sir HENRY THOMPSON, F.R.C.S., Emeritus Professor of Clinical Surgery and Consulting Surgeon to University College Hospital. Eighth Edition. 8vo, with 121 Engravings, 10s. 6d.

By the same Author.

Diseases of the Prostate :

Their Pathology and Treatment. Sixth Edition. 8vo, with 39 Engravings, 6s.

Also.

Surgery of the Urinary Organs.

Some Important Points connected therewith. Lectures delivered in the R.C.S. 8vo, with 44 Engravings. Students' Edition, 2s. 6d.

Also.

Practical Lithotomy and Lithotrity; or, An Inquiry into the Best Modes of Removing Stone from the Bladder. Third Edition. 8vo, with 87 Engravings, 10s.

Also.

The Preventive Treatment of Calculous Disease, and the Use of Solvent Remedies. Third Edition. Crown 8vo, 2s. 6d.

Also.

Tumours of the Bladder :

Their Nature, Symptoms, and Surgical Treatment. 8vo, with numerous Illustrations, 5s.

Also.

Stricture of the Urethra, and Urinary Fistulæ; their Pathology and Treatment. Fourth Edition. With 74 Engravings. 8vo, 6s.

Also.

The Suprapubic Operation of Opening the Bladder for the Stone and for Tumours. 8vo, with 14 Engravings, 3s. 6d.

Electric Illumination of the Male Bladder and Urethra, as a Means of Diagnosis of Obscure Vesico-Urethral Diseases. By E. HURRY FENWICK, F.R.C.S., Assistant Surgeon to the London Hospital and Surgeon to St. Peter's Hospital for Stone. 8vo, with 30 Engravings, 4s. 6d.

Modern Treatment of Stone in the Bladder by Litholopaxy. By P. J. FREYER, M.A., M.D., M.Ch., Bengal Medical Service. 8vo, with Engravings 5s.

The Surgical Diseases of the Genito-Urinary Organs, including Syphilis. By E. L. KEYES, M.D., Professor of Genito-Urinary Surgery, Syphilology, and Dermatology in Bellevue Hospital Medical College, New York (a revision of VAN BUREN and KEYES' Text-book). Roy. 8vo, with 114 Engravings, 21s.

The Surgery of the Rectum.

By HENRY SMITH, Emeritus Professor of Surgery in King's College, Consulting Surgeon to the Hospital. Fifth Edition. 8vo, 6s.

Diseases of the Rectum and Anus.

By W. HARRISON CRIPPS, F.R.C.S., Assistant Surgeon to St. Bartholomew's Hospital, &c. 8vo, with 13 Lithographic Plates and numerous Wood Engravings, 12s. 6d.

Urinary and Renal Derangements and Calculous Disorders.

By LIONEL S. BEALE, F.R.C.P., F.R.S., Physician to King's College Hospital. 8vo, 5s.

The Diagnosis and Treatment of Diseases of the Rectum.

By WILLIAM ALLINGHAM, F.R.C.S., Surgeon to St. Mark's Hospital for Fistula. Fifth Edition. By HERBERT WM. ALLINGHAM, F.R.C.S., Surgeon to the Great Northern Central Hospital, Demonstrator of Anatomy at St. George's Hospital. 8vo, with 53 Engravings. 10s. 6d.

Syphilis and Pseudo-Syphilis.

By ALFRED COOPER, F.R.C.S., Surgeon to the Lock Hospital, to St. Mark's and the West London Hospitals. 8vo, 10s. 6d.

Diagnosis and Treatment of Syphilis. By TOM ROBINSON, M.D., Physician to St. John's Hospital for Diseases of the Skin. Crown 8vo, 3s. 6d.

By the same Author.

Eczema: its Etiology, Pathology, and Treatment. Crown 8vo, 3s. 6d.

Coulson on Diseases of the Bladder and Prostate Gland. Sixth Edition. By WALTER J. COULSON, Surgeon to the Lock Hospital and to St. Peter's Hospital for Stone. 8vo, 16s.

The Medical Adviser in Life Assurance. By SIR E. H. SIEVEKING, M.D., F.R.C.P. Second Edition. Crown 8vo, 6s.

A Medical Vocabulary :

An Explanation of all Terms and Phrases used in the various Departments of Medical Science and Practice, their Derivation, Meaning, Application, and Pronunciation. By R. G. MAYNE, M.D., LL.D. Sixth Edition, by W. W. WAGSTAFFE, B.A., F.R.C.S. Crown 8vo, 10s. 6d.

A Dictionary of Medical Science:

Containing a concise Explanation of the various Subjects and Terms of Medicine, &c. By ROBLEY DUNGLISON, M.D., LL.D. Royal 8vo, 28s.

INDEX.

- Abercrombie's Medical Jurisprudence, 4
 Adams (W.) on Clubfoot, 11
 — on Curvature of the Spine, 11
 Allan's Outlines of Infectious Diseases, 7
 Allingham on Diseases of the Rectum, 14
 Balfour's Diseases of the Heart and Aorta, 9
 Balkwill's Mechanical Dentistry, 12
 Barnes (R.) on Obstetric Operations, 5
 — on Diseases of Women, 5
 Basil's Commoner Diseases and Accidents, 10
 Beale's Microscope in Medicine, 8
 — Slight Ailments, 8
 — Urinary and Renal Derangements, 14
 Bellamy's Surgical Anatomy, 3
 Bennet (J. H.) on the Mediterranean, 10
 Bentley and Trimen's Medicinal Plants, 7
 Bentley's Manual of Botany, 7
 — Structural Botany, 7
 — Systematic Botany, 7
 Bowlby's Surgical Pathology and Morbid Anatomy, 11
 Braune's Topographical Anatomy, 3
 Brodhurst's Anchylosis, 11
 — Curvatures, &c., of the Spine, 11
 — Orthopædic Surgery, 11
 Bryant's Acute Intestinal Strangulation, 9
 — Practice of Surgery, 11
 — Tension. Inflammation of Bone, Injuries, &c., 11
 Bucknill and Tuke's Psychological Medicine, 5
 Buist's Vaccinia and Variola, 8
 Bulkley's Acne, 13
 — Diseases of the Skin, 13
 Burdett's Pay Hospitals, 4
 Burton's Midwifery for Midwives, 6
 Butlin's Malignant Disease of the Larynx, 13
 — Operative Surgery of Malignant Disease, 13
 — Sarcoma and Carcinoma, 13
 Buzzard's Diseases of the Nervous System, 9
 — Peripheral Neuritis, 9
 Byford's Diseases of, and Accidents to, Women, 6
 Carpenter's Human Physiology, 4
 Charteris on Health Resorts, 10
 — Practice of Medicine, 8
 Chevers' Diseases of India, 7
 Churchill's Face and Foot Deformities, 11
 Clouston's Lectures on Mental Diseases, 5
 Cooper's Syphilis and Pseudo-Syphilis, 14
 Coulson on Diseases of the Bladder, 14
 Courty's Diseases of the Uterus, Ovaries, &c., 6
 Cripps' Diseases of the Rectum and Anus, 14
 Cullingworth's Manual of Nursing, 6
 — Short Manual for Monthly Nurses, 6
 Dalby's Diseases and Injuries of the Ear, 12
 — Short Contributions, 12
 Day on Diseases of Children, 6
 — on Headaches, 10
 Dobell's Lectures on Winter Cough, 8
 — Loss of Weight, &c., 8
 — Mont Doré Cure, 8
 Domville's Manual for Nurses, 6
 Doran's Gynæcological Operations, 6
 Down's Mental Affections of Childhood, 5
 Draper's Text Book of Medical Physics, 4
 Druitt's Surgeon's Vade-Mecum, 11
 Duncan (A.) on Prevention of Disease in Tropics, 7
 Duncan (J. M.) on Diseases of Women, 5
 Dunglison's Medical Dictionary, 14
 Ebstein on Regimen in Gout, 9
 Ellis's Diseases of Children, 6
 Ewart's Bronchi and Pulmonary Blood Vessels, 8
 Fagge's Principles and Practice of Medicine, 8
 Fayrer's Climate and Fevers of India, 7
 — Natural History, etc., of Cholera, 7
 Fenwick (E. H.), Electric Illumination of Bladder, 14
 Fenwick's (S.) Chronic Atrophy of the Stomach, 8
 — Medical Diagnosis, 8
 — Outlines of Medical Treatment, 8
 — The Saliva as a Test, 8
 Flint's Principles and Practice of Medicine, 7
 Flower's Diagrams of the Nerves, 3
 Fox's (C. B.) Examinations of Water, Air, and Food, 4
 Fox's (T.) Atlas of Skin Diseases, 13
 Fox (Wilson), Atlas of Pathological Anatomy of Lungs, 8
 Freyer's Litholopaxy, 14
 Galabin's Diseases of Women, 6
 Galabin's Manual of Midwifery, 5
 Godlee's Atlas of Human Anatomy, 3
 Goodhart's Diseases of Children, 6
 Gowers' Diseases of the Brain, 9
 — Diseases of the Spinal Cord, 9
 — Manual of Diseases of Nervous System, 9
 — Medical Ophthalmoscopy, 9
 Granville on Gout, 9
 Guy's Hospital Formulae, 2
 — Reports, 2
 Habershon's Diseases of the Abdomen, 9
 — Liver, 9
 — Stomach, 9
 — Pneumogastric Nerve, 9
 Harley on Diseases of the Liver, 9
 — Inflammations of the Liver, 9
 Harris's (C. A.) Dentistry, 13
 Harris's (V. D.) Diseases of Chest, 8
 Harrison's Surgical Disorders of the Urinary Organs, 13
 Hartridge's Refraction of the Eye, 12
 Harvey's Manuscript Lectures, 3
 Heath's Certain Diseases of the Jaws, 10
 — Injuries and Diseases of the Jaws, 10
 — Minor Surgery and Bandaging, 10
 — Operative Surgery, 10
 — Practical Anatomy, 3
 — Surgical Diagnosis, 10
 Higgins' Ophthalmic Out-patient Practice, 11
 Hillis' Leprosy in British Guiana, 13
 Holden's Dissections, 3
 — Human Osteology, 3
 — Landmarks, 3
 Hood's (D. C.) Diseases and their Commencement, 6
 Hood (P.) on Gout, Rheumatism, &c., 9
 Hooper's Physician's Vade-Mecum, 8
 Hutchinson's Clinical Surgery, 11
 — Rare Diseases of the Skin, 13
 Hyde's Diseases of the Skin, 13
 Jacobson's Operations of Surgery, 11
 James (P.) on Sore Throat, 12
 Jessett's Cancer of the Mouth, &c., 13
 Johnson's Asphyxia, 8
 — Medical Lectures and Essays, 8
 Jones (C. H.) and Sieveking's Pathological Anatomy, 4
 Jones' (H. McN.) Diseases of the Ear and Pharynx, 12
 — Atlas of Diseases of Membrana Tympani, 12
 Journal of British Dental Association, 2
 — Mental Science, 2
 Keyes' Genito-Urinary Organs and Syphilis, 14
 King's Manual of Obstetrics, 5
 Lancereaux's Atlas of Pathological Anatomy, 4
 Lawson's Milroy Lectures on Epidemiology, 5
 Lewis (Bevan) on the Human Brain, 4
 Liebreich's Atlas of Ophthalmoscopy, 12
 London Hospital Pharmacopœia, 2
 Lückes' Hospital Sisters and their Duties, 6
 Macdonald's (J. D.) Examination of Water and Air, 4
 Mackenzie on Diptheria, 12
 MacLagan on Fever, 8
 McLeod's Operative Surgery, 10
 MacMunn's Clinical Chemistry of Urine, 13
 Macnamara's Diseases of the Eye, 12
 — Bones and Joints, 11
 Mapother's Papers on Dermatology, 13
 Martin's Ambulance Lectures, 10
 Mayne's Medical Vocabulary, 14
 Middlesex Hospital Reports, 2
 Moore's Family Medicine for India, 7
 — Manual of the Diseases of India, 7
 Morris' (H.) Anatomy of the Joints, 3
 Morton's Spina Bifida, 11
 Mouat and Snell on Hospitals, 4
 Nettleship's Diseases of the Eye, 12
 Ogle on Puncturing the Abdomen, 9
 Ogston's Medical Jurisprudence, 4
 Ophthalmic (Royal London) Hospital Reports, 2
 Ophthalmological Society's Transactions, 2
 Oppert's Hospitals, Infirmarys, Dispensaries, &c., 4
 Osborn on Diseases of the Testis, 13
 — on Hydrocele, 13
 Owen's Materia Medica, 7
 Page's Injuries of the Spine, 11
 Parkes' Practical Hygiene, 5
 Pavy on Diabetes, 10
 — on Food and Dietetics, 10
 Pharmaceutical Journal, 2
 Phillips' Materia Medica and Therapeutics, 7
 Pollock's Histology of the Eye and Eyelids, 12
 Priestley's Intra-Uterine Death, 5

[Continued on the next page.]

Purcell on Cancer, 13
 Raye's Ambulance Handbook, 10
 Reynolds' (J. J.) Diseases of Women, 5
 Notes on Midwifery, 5
 Richardson's Mechanical Dentistry, 13
 Roberts' (C.) Detection of Colour-Blindness, 5
 Roberts' (D. Lloyd) Practice of Midwifery, 5
 Robinson (Tom) on Eczema, 14
 on Syphilis, 14
 Robinson (W.) on Endemic Gout or Thyroæcele, 12
 Ross's Aphasia, 9
 Diseases of the Nervous System, 9
 Routh's Infant Feeding, 6
 Royal College of Surgeons Museum Catalogues, 2
 Royle and Harley's Materia Medica, 7
 St. Bartholomew's Hospital Catalogue, 2
 St. George's Hospital Reports, 2
 St. Thomas's Hospital Reports, 2
 Sansom's Valvular Disease of the Heart, 8
 Savage on the Female Pelvic Organs, 5
 Schweigger on Squint, 12
 Sewill's Dental Anatomy, 12
 Shore's Elementary Practical Biology, 4
 Sieveking's Life Assurance, 14
 Silk's Manual of Nitrous Oxide, 12
 Simon's Public Health Reports, 4
 Smith's (E.) Clinical Studies, 6
 Diseases in Children, 6
 Wasting Diseases of Infants and Children, 6
 Smith's (J. Greig) Abdominal Surgery, 6
 Smith's (Henry) Surgery of the Rectum, 14
 Southam's Regional Surgery, 11
 Squire's (P.) Companion to the Pharmacopœia, 7
 Pharmacopœias of London Hospitals, 7
 Squire's (W.) Essays on Preventive Medicine, 8
 Steavenson's Electricity, 11
 Stimson's Dislocations, 11
 Fractures, 11
 Stocken's Dental Materia Medica and Therapeutics, 13
 Sutton's General Pathology, 4
 Swain's Surgical Emergencies, 10
 Swayne's Obstetric Aphorisms, 6
 Taylor's Medical Jurisprudence, 4

Taylor's Poisons in relation to Medical Jurisprudence, 4
 Thin's Cancerous Affections of the Skin, 13
 Pathology and Treatment of Ringworm, 13
 Thomas's Diseases of Women, 6
 Thompson's (Sir H.) Calculous Disease, 14
 Diseases of the Prostate, 14
 Diseases of the Urinary Organs, 14
 Lithotomy and Lithotripsy, 14
 Stricture of the Urethra, 14
 Suprapubic Operation, 14
 Surgery of the Urinary Organs, 14
 Tumours of the Bladder, 14
 Thorowgood on Asthma, 9
 on Materia Medica and Therapeutics, 7
 Tibbitts' Map of Motor Points, 10
 How to use a Galvanic Battery, 10
 Electrical and Anatomical Demonstrations, 10
 Tilt's Change of Life, 6
 Urine Therapeutics, 6
 Tirard's Prescriber's Pharmacopœia, 7
 Tomes' (C. S.) Dental Anatomy, 12
 Tomes' (J. and C. S.) Dental Surgery, 12
 Tuke's Influence of the Mind upon the Body, 5
 Sleep-Walking and Hypnotism, 5
 Vintras on the Mineral Waters, &c., of France,
 Virchow's Post-mortem Examinations, 4
 Walsham's Surgery: its Theory and Practice, 11
 Waring's Indian Bazaar Medicines, 7
 Practical Therapeutics, 7
 Warner's Guide to Medical Case-Taking, 8
 Waters' (A. T. H.) Contributions to Medicine, 8
 West and Duncan's Diseases of Women, 6
 West's (S.) How to Examine the Chest, 8
 Wilks' Diseases of the Nervous System, 8
 Wilson's (Sir E.) Anatomists' Vade-Mecum, 3
 Wilson's (G.) Handbook of Hygiene, 5
 Healthy Life and Dwellings, 5
 Wilson's (W. S.) Ocean as a Health-Resort, 10
 Wolfe's Diseases and Injuries of the Eye, 11
 Wolfenden and Martin's Pathological Anatomy, 12
 Year Book of Pharmacy, 2
 Yeo's (G. F.) Manual of Physiology, 4

The following CATALOGUES issued by J. & A. CHURCHILL will be forwarded post free on application:—

A. *J. & A. Churchill's General List of about 650 works on Anatomy, Physiology, Hygiene, Midwifery, Materia Medica, Medicine, Surgery, Chemistry, Botany, &c., &c., with a complete Index to their Subjects, for easy reference.*
 N.B.—This List includes B, C, & D.

B. *Selection from J. & A. Churchill's General List, comprising all recent Works published by them on the Art and Science of Medicine.*

C. *J. & A. Churchill's Catalogue of Text Books specially arranged for Students.*

D. *A selected and descriptive List of J. & A. Churchill's Works on Chemistry, Materia Medica, Pharmacy, Botany, Photography, Zoology, the Microscope, and other branches of Science.*

E. *The Medical Intelligencer being a List of New Works and New Editions published by J. & A. Churchill.*

[Sent yearly to every Medical Practitioner in the United Kingdom whose name and address can be ascertained. A large number are also sent to the United States of America, Continental Europe, India, and the Colonies.]

AMERICA.—J. & A. Churchill being in constant communication with various publishing houses in Boston, New York, and Philadelphia, are able, notwithstanding the absence of international copyright, to conduct negotiations favourable to English Authors.

LONDON: 11, NEW BURLINGTON STREET.



